Missouri Department of Transportation

Bridge Division

Bridge Design Manual

Section 4

Revised 10/15/2003

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GENERAL

(A1.1)✳

General Notes:

Design Specifications:

Use the following note on plans before July 2003 Letting.

AASHTO - 1996 and Interims thru 2002

Use the following note on plans in and after July 2003 Letting.

2002 - AASHTO 17th Edition
Load Factor Design
Seismic Performance Category A B C D
Acceleration Coefficient = _____

Design Loading:

H20-44
HS20-44
HS20 Modified
35#/Sq. Ft. No Future Wearing Surface
Military 24,000# Tandem Axle
Defense Transporter Erector Loading
Earth 120 #/Cu. Ft., Equivalent Fluid Pressure 45#/Cu. Ft. (1)
Ø = _____
Fatigue Stress - Case I Case II Case III
Superstructure: Simply-supported, non-composite for dead load.
Continuous composite for live load.
(2)

Design Unit Stresses:

Class B Concrete (Substructure) f'c = 3,000 psi

(1) Use 45 #/cu. ft.(Min.) for bridges and retaining walls, and 30 #/cu. ft.(Min.), 60 #/cu.ft.(Max.) for box culverts. (Modify if Ø angle dictates.)

(2) All Prestressed Concrete Girder Structures.

✳ Omit parts not applicable.

GENERAL (CONT.)

(A1.1) (Cont.)*

Design Unit Stresses:

Class B Concrete (Pedestal Pile)	fc = 1,200	f'c = 3,000	psi
Class B Concrete (Substructure)	fc = 1,200	f'c = 3,000	psi
Class B-1 Concrete (Superstructure)	fc = 1,600	f'c = 4,000	psi
Class B-2 Concrete (Superstructure, except Prestressed Girders and Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete (Substructure)	fc = 1,600	f'c = 4,000	psi
Class B-1 Concrete (Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi
Class B-2 Concrete (Superstructure, except Safety Barrier and Median Barrier Curb)	fc = 1,600	f'c = 4,000	psi(1)
Reinforcing Steel (Grade 40)	fs = 20,000	fy = 40,000	psi
Reinforcing Steel (Grade 60)	fs = 24,000	fy = 60,000	psi
Structural Carbon Steel(ASTM A709 Grade 36)	fs = 20,000	fy = 36,000	psi
Structural Steel (ASTM A441)	fs = 23,000	fy = 42,000	psi
Structural Steel (ASTM A441)	fs = 25,000	fy = 46,000	psi
Structural Steel (ASTM A441)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade 42)	fs = 23,000	fy = 42,000	psi
Structural Steel (ASTM A709 Grade 50)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade 50W)	fs = 27,000	fy = 50,000	psi
Structural Steel (ASTM A709 Grade HPS70W)	fs = 38,000	fy = 70,000	psi
Steel Pile (ASTM A709 Grade 36)	fb = **	fy = 36,000	psi
Steel Pile (ASTM A709 Grade 50)	fb = **	fy = 50,000	psi

For Precast Prestressed Panel Stresses, See Sheet No. .

For Prestressed Girder Stresses, See Sheet No. .

* Omit parts not applicable.

** 6,000 9,000 12,000 Design bearing for point bearing piles which are to be driven to rock or other point bearing material shall be designed 9,000 psi, unless the Design Layout specifies otherwise.

(1) Slabs, diaphragms or beams poured integrally with the slab.

Note to Detailer: Use f'c and fy for Load Factor Design.

Omit parts underlined when not applicable.

A – GENERAL NOTES

CULVERTS AND OTHER BOX TYPE STRUCTURES

All Boxes on Rock

(A2.1)

Anchor full length of walls by excavating 6″ into and casting concrete against vertical faces of hard, solid, undisturbed rock.

(A2.1.1)

Holes shall be drilled 12″ into solid rock with E1 and E2 bars grouted in.

All Boxes with Bottom Slab

(A2.2)

When alternate precast box sections are used, the minimum barrel length measured along the shortest wall from the first joint to the outside of the headwall, shall be 3′-2″. Reinforcement and dimensions for the wings and headwalls shall be in accordance with Missouri Standard Plans drawing.

Culverts on Rock Where Holes or Crevices may be Found (Normally where soundings show rock to be very irregular)

(A2.3)

(The designer should check with Structural Project Manager before placing this note on the plans.)

Where, under short lengths of walls, top of rock is below elevations given for bottom of walls, plain concrete footings 3′-0″ in width shall, in general, be poured up from rock to bottom of walls. If top of rock is more than 3′-0″ below bottom of short wall sections, the walls between points of support on rock, shall be designed and reinforced as beams and spaces below walls filled as directed by the engineer. Payment for plain concrete footings and concrete reinforced as wall beams will be made at the contract unit price for Class B Concrete.

Box Type Structures on Rock or Shale Widened or Extended with Floor (Example)

(A2.4)

Fill material under the 5″ slab shall be firmly tamped before the slab is poured.

CULVERTS AND OTHER BOX TYPE STRUCTURES (CONT.)

Box Culverts with Bottom Slab that Encounter Rock

(Use the following note (A2.5) when specified on the Design Layout.)

(A2.5)

Excavate rock 6″ below low concrete in the structure and backfill with suitable material in accordance with Section 206.4.4, of the Missouri Standard Specifications.

Curved Box Culverts

(Box on curve)

(A2.6)

The contractor will be allowed to build the curved portion of the structure on chords (Maximum of 16′-0″) if he or she desires.

(Use the following note (A2.7) when special backfill is specified on the Design Layout.)

(A2.7)

Excavate 3′-0″ below the box and fill with suitable backfill material.

For Box Culverts where collar is provided, place the following note on plan sheet.

(A2.8)

If precast option is used, collars shall be provided between all precast piece.

(A2.9)

For Box Culverts with transverse joint(s), place the following note on plan sheet (this note is not needed if an appropriate standard plan is referenced).

A filter cloth 3 feet in width and double thickness shall be applied to all transverse joints in the top slab and sidewalls. The material shall be centered on the joint and the edges sealed with a mastic or with two sided tape. The filter cloth shall be a geotextile meeting the approval of the engineer and having a grab tensile strength of 180 pounds (ASTM D-4632) and an apparent opening size of 50 to 100 (ASTM D-4751). No direct payment will be made for furnishing and installing the filter cloth.

A – GENERAL NOTES

PRESTRESSED GIRDER STRUCTURES

Note for Stresses:

(A3.1)

For Prestressed Girder Stresses, See Sheet No. __.

Neoprene Pads:

(A3.2)

Bearings shall be 50 60 70 durometer neoprene pads. The neoprene pad shall be bonded to the bearing seat with an epoxy adhesive as approved by the bearing manufacturer for bonding neoprene to concrete.

STEEL STRUCTURES

Fabricated Steel Connections:

(A3.3)

Field connections shall be made with 3/4″ diameter high strength bolts and 13/16″ diameter holes, except as noted.

ALL STRUCTURES (EXCEPT CULVERTS)

Joint Filler:

(A3.4)

All joint filler shall meet the requirements of Section 1057.2.4 of the Missouri Standard Specifications, except as noted.

ALL STRUCTURES

Reinforcing Steel:

(A3.5)

Minimum clearance to reinforcing steel shall be 1-1/2″, unless otherwise shown.

A - GENERAL NOTES

COATING

New Steel Structures - Non-Weathering Steel

(A4.1)

Protective Coating: System G H by the contractor. (See Special Provisions.)

(A4.2)

Prime Coat: The cost of the prime coat shall be included in the contract unit price of the Fabricated Structural Steel. Tint of the prime coat for System G H shall be similar to the color of the field coat to be used.

(A4.3)(*)

Field Coat: The color of the finish coat shall be Gray (Federal Standard #26373) Brown (Federal Standard #30045. The cost of the intermediate coat shall be included in the contract unit price per sq. foot ton of Intermediate Field Coat (System G H) Gray Brown The cost of the finish coat shall be included in the contract unit price per sq. foot ton of Finish Field Coat (System G H) Gray Brown (See Special Provisions.) At the option of the contractor, the intermediate and/or finish field coats may be applied in the shop. The contractor shall exercise extreme care during all phases of loading, hauling, handling, erection and pouring of the slab to minimize damage and shall be fully responsible for all repairs and cleaning of the coating systems as required by the engineer.

New Steel Structures - Weathering Steel

(A4.11)

Protective Coating: System H by the contractor (See Special Provisions).

(A4.12)

Portions of the structural steel embedded in or in contact with concrete, including but not limited to the top flange of girders, shall be coated with not less than 2.0 mils of the prime coat for System H.

(A4.13)

Prime Coat: The prime coat shall be applied in the fabrication shop. The cost of the prime coat shall be included in the contract unit price of the Fabricated Structural Steel.

Use notes (A4.14) and (A4.15) when weathering steel structures have an expansion device.

(A4.14)

The surfaces of all structural steel located under expansion joints shall be coated with complete System H within a distance of 1-1/2 times the girder depth, but not less than 10 feet, from the centerline of all deck joints. Within this limit, items to be coated shall include all surfaces of beam, girders, diaphragms, stiffeners, bearings and miscellaneous structural steel items.

(*) The coating color shall be specified on the Design Layout.

Omit parts underlined when not applicable.

COATING (CONT.)

Use notes (A4.14) and (A4.15) when weathering steel structures have an expansion device.

(A4.15)

Field Coat: The color of the finish coat shall be Brown (Federal Standard #30045). The cost of the intermediate and finish coats shall be included in the contract unit price of the Fabricated Structural Steel. At the option of the contractor, the intermediate and/or finish field coats may be applied in the shop. The contractor shall exercise extreme care during all phases of loading, hauling, handling, erection and pouring of the slab to minimize damage and shall be fully responsible for all repairs and cleaning of the coating systems as required by the engineer.

Structures with Exposed Piling

Use note (A4.21) for steel structures or combination structures of steel and concrete having steel sway bracing on piles.

(A4.21)

The prime coat on bracing for intermediate bents shall be the specified system and may be applied in the shop or field.

Use note (A4.22) for concrete structures with exposed piling.

(A4.22)

All exposed surfaces of structural steel piles cast-in-place piles and steel sway bracing shall be painted with a calcium sulfonate system in accordance with the Special Provisions.

Structures having Access Doors

(A4.23)

Structural steel access doors shall be cleaned and coated in the shop or field with at least two coats of inorganic zinc primer to provide a minimum dry film thickness of 5 mils. In lieu of coating the access doors may be galvanized in accordance with ASTM A123 and A153. The cost of coating or galvanizing doors shall be included in the contract unit price for other items.

Weathering Steel or Concrete Structures having Girder Chairs but no Coating Item.

(A4.24)

Structural steel for the girder chairs shall be coated with not less than 2 mils of inorganic zinc primer. Scratched or damaged surfaces are to be touched up in the field before concrete is poured. In lieu of coating, the girder chairs may be galvanized in accordance with ASTM A123. The cost of coating or galvanizing girder chairs shall be included in the contract unit price for other items.

A - GENERAL NOTES

MISCELLANEOUS

(In "General Notes:" section of plans, place the following notes under the heading "Miscellaneous")

(Use the following note on all grade separations & bridges over railroads.)

(A5.1)

A minimum vertical clearance of __'-_" from top of rails crown of existing lanes and a minimum lateral clearance of __'-_" from the centerline of track to nearest temporary construction falsework centered on existing lane shall be maintained during construction.

(Use the following note when traffic is to be maintained during construction)

(A5.2)

Traffic over structure to be maintained during construction.

(Use the following note on all jobs with high strength bolts.)

(A5.3)

High strength bolts, nuts and washers will be sampled for quality assurance as specified in Standard Specification 106 and Field Section (FS-712) from Materials Manual.

(Use the following note for structures having detached wing walls at end bents.)

(A5.4)

Payment for furnishing all materials, labor and excavation necessary to construct the Lt. Rt. both detached wing walls at End Bents No. __ and No.____ including the Class _ Excavation, ___Pile, __(1)__, Class B B-1 Concrete (Substr.) (2) and Reinforcing Steel (Bridges), shall be made and considered fully covered under the contract unit price for these items.

(1) List all items used for the detached wing walls.

(2) For continuous concrete slab bridges, the detached wing walls could be either Class B or Class B-1. (For slab bridges with Class B spread footings, the detached wing walls might as well be Class B, otherwise, Class B-1 may be used.) Check with Project Manager.

Omit parts underlined when not applicable.

B - NOTES FOR ESTIMATED QUANTITIES

CONCRETE

Integral End Bents (When bridge slab quantity using note B3.1 table only)

Use the following note (B1.1) on steel structures only.

(B1.1)

All concrete above the lower construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities.

(B1.2)

All concrete above the construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities.

Integral End Bents (When bridge slab quantity using note B3.8A or B3.8B table, slab bid per sq. yd.)
Use the following note (B1.3) on steel structures only.

(B1.3)

All concrete between the upper and lower construction joints in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Steel.

(B1.4)

All concrete above the construction joint in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Integral End Bents

(B1.5)

All reinforcement in the end bents (except detached wing walls) is included in the Estimated Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

Intermediate Bents with Concrete Diaphragms

(B1.5.1)

All reinforcement in the intermediate bent concrete diaphragms except reinforcement embedded in the beam cap is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

(B1.5.2)

All concrete above the intermediate beam cap is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Non-Integral End Bents with Concrete Diaphragms

(B1.5.3)

All reinforcement in the concrete diaphragms at End Bents No. __is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

(B1.5.4)

All concrete in the concrete diaphragm at End Bents is included in the Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder.

Semi-Deep Abutments

(B1.6)

All concrete and reinforcing steel below top of slab and above construction joint in Semi-Deep Abutments is included in the Estimated Quantities for Slab on Semi-Deep Abutments.

Omit parts underlined when not applicable.

B - NOTES FOR ESTIMATED QUANTITIES

CONCRETE (CONT.)

End Bents with Expansion Device

(B1.7)

Concrete above the upper construction joint in backwall at End Bents No. __ is included with Class B-2 Concrete (Slab on _____) Quantities.

Sidewalk

(B1.8)

All concrete and reinforcing steel in sidewalk is included in the contract unit price for Sidewalk (Bridges).

Continuous Concrete Slab Bridge (Notes B1.9.1 thru B1.9.6)

End Bents

(B1.9.1)

All concrete above the construction joint in the end bents (except detached wing walls) is included with the Superstructure Quantities

(B1.9.2)

All reinforcement in the end bents (except detached wing walls) is included with the Superstructure Quantities.

Intermediate Integral Column Bents

(B1.9.3)

All concrete above construction joint between slab and columns in the intermediate bents is included with Superstructure Quantities.

(B1.9.4)

All reinforcement in the intermediate bent columns is included with Superstructure Quantities.

Intermediate Integral Pile Cap Bents

(B1.9.5)

All concrete in the intermediate bent caps is included with Superstructure Quantities.

(B1.9.6)

All reinforcement in the intermediate bent caps is included with Superstructure Quantities.

B - NOTES FOR ESTIMATED QUANTITIES

EXCAVATION

Use the following note (B1.10) when total estimated excavation is less than 10 cubic yards (No "excavation" item in the Estimated Quantities).

(B1.10)

Cost of any required excavation for bridge shall be included in the contract unit price for other items.

Retaining Walls

(B1.11)

No Class 1 Excavation will be paid for above lower limits of roadway excavation.

SWAY BRACING

Concrete Structures Having Sway Bracing on Steel Bearing Piles

(B1.12)

The cost of furnishing and installing steel sway bracing on piles at the intermediate bents, will be paid for at the contract unit price for Fabricated Structural Carbon Steel (Misc.).

Note to Detailer:
For structures having steel sway bracing on piles, the weight of the bracing shall be shown under the substructure quantities.

(B1.13)

No direct payment will be made for cleaning and coating of bracing at intermediate bents.

NEOPRENE BEARING PADS

(B1.14)

The cost of furnishing, fabricating and installing Neoprene Bearing Pads, complete-in-place, will be paid for at the contract unit price for Plain Laminated Neoprene Bearing Pads (Tapered) per each linear foot.

Note to Detailer:
The above note (B1.14), does not apply to type "N" PTFE Bearings for prestressed structures.

B - NOTES FOR ESTIMATED QUANTITIES

STRUCTURAL STEEL

Threaded Steel Bars (Concrete Diaphragms) - Not Listed in Bar Bill.

(B2.1)
Weight of threaded 3/4" Ø rods and nuts in end diaphragm is included in the weight of Fabricated Structural Steel.

Access Doors (Structures With no Other Fabricated Structural Steel)

(B2.2)
Payment for furnishing, coating or galvanizing and installing access doors and frames shall be made and considered fully covered under the contract unit price for other items.

REINFORCING STEEL (WELDED WIRE FABRIC)

(B2.4)
Weight of 6 x 6 - W2.1 x W2.1 (✳) welded wire fabric is included in Estimated Weight of Reinforcing Steel.

WELDED WIRE FABRIC WEIGHT			
STYLE	SPACE	SIZE	LBS./100 SQ. FT.
6 x 6 - W2.1 x W2.1	6"	8 ga.	30
4 x 4 - W4 x W4	4"	4 ga.	85

See CRSI Manual for other sizes.

Table should not be shown on plans.

✳ Modify for type actually used. Show type on details where the fabric is shown.

"W" denotes smooth wire; the number following indicates cross sectional area in hundredths of a square inch. Deformed wire is denoted by the letter "D".

Omit parts underlined when not applicable.

B - NOTES FOR ESTIMATED QUANTITIES

ESTIMATED QUANTITIES TABLES

(B3.1)

Estimated Quantities				
Item		Substr.	Superstr.	Total
Class 1 Excavation	cu. yard			
② Structural Steel Piles ( )	linear foot			
Class B Concrete	cu. yard			
③ Safety Barrier Curb	linear foot			
Reinforcing Steel (Bridges)	pound			
①				

①In special cases, entries are made to the quantities table by the districts after plans are completed. When notes are placed too close to the bottom of this table, additional quantities cannot be entered efficiently. The request has been made that space be left for at least four (4) additional entries to the table before notes are placed on the plans.

②The following note shall be placed under the estimated quantities box when steel piles are used in Seismic Performance Categories B, C & D.

(B3.2)

Cost of channel shear connectors C4 x 5.4 (ASTM A709 Grade 36) in place to be included in contract unit price for Structural Steel Piles (10 in. 12 in. 14 in.).

③Place an ✳ next to the safety barrier curb in the quantity box and add the following note under the estimated quantities box.

(B3.3)

✳ Safety barrier curb shall be cast-in-place option or slip-form option.

The following notes shall be placed under the estimated quantities box when CIP piles are used in Seismic Performance Categories B, C and D.

(B3.4)

All reinforcement in cast-in-place piling at end bents is included in the superstructure quantities.

(B3.5)

B - NOTES FOR ESTIMATED QUANTITIES

ESTIMATED QUANTITIES TABLES (CONT.)

Do not use for slab brides with CIP Pile Caps.

(B3.5)

All reinforcement in cast-in-place piling at intermediate bents is included in the substructure quantities for intermediate bents.

Use for slab brides with CIP Pile Caps.

(B3.5.1)

All reinforcement in cast-in-place piling at intermediate bents is included in the superstructure quantities for intermediate bents.

Estimated Quantities Table for Box Culverts

The quantities table on box culvert plans should show an extra column to the right in the table that is labeled "Final Quantities". Estimated quantities should be inserted to the left of this column in the usual manner by the detailer as shown in the example below.

The four extra spaces at the bottom of the table are not required as specified above.

(B3.6)

	Estimated Quantities				Final Quantities
	Class 3 Excavation	cu. yard			
✳	Class B-1 Concrete (Culverts-Bridge)	cu. yard			
	Reinforcing Steel (Culverts-Bridge)	pound			
	Granular Backfill (Culverts-Bridge)	cu. yard			

✳ Note to Detailer:
If distance from ℄ sidewall to ℄ sidewall is ≥ 20′ then should use (Culverts-Bridge) but if < 20′ should use Class B-1 Concrete (Culverts).

B - NOTES FOR ESTIMATED QUANTITIES

ESTIMATED QUANTITIES TABLES (CONT.)

Slab:

The following table is to be placed on the design plans under the table of estimated quantities.

(B3.8A) Table of Slab Quantities

Estimated Quantities for Slab on Concrete I-Girder Bulb-Tee Girder			
Item		Total	
Reinforcing Steel	pound		
Reinforcing Steel (Epoxy Coated)	pound		
Class B-2 Concrete	cu. yard		(**)

(B3.8S) Table of Slab Quantities

Estimated Quantities for Slab on Steel			
Item		Total	
Reinforcing Steel	pound		
Reinforcing Steel (Epoxy Coated)	pound		
Class B-2 Concrete	cu. yard		(*)

(B3.9)

The table of Estimated Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder represents the quantities used by the state in preparing the cost estimate for concrete slabs. Variations may be encountered in these estimated quantities but these variations cannot be used for an adjustment in the contract unit price per sq. yard of Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

(B3.10)

See Special Provisions for alternate methods of forming slabs.

See following sheet for (*) and (**).

B - NOTES FOR ESTIMATED QUANTITIES

ESTIMATED QUANTITIES TABLES (CONT.)

Slab (Stay-In-Place Forms)

(B3.11)
(✳) Does not include concrete required to fill corrugations of S.I.P. Forms.

Precast Prestressed Panels:

(B3.13)
The Estimated Quantities for Slab on Concrete_I-Girder Steel Concrete_Bulb-Tee_Girder are based on skewed precast prestressed end panels.

(B3.14)
(✳✳) Based on minimum top flange thickness and minimum joint filler thickness.

(B3.15)
The prestressed panel quantities are not included in the table of Estimated Quantities for Slab on Steel Concrete_I-Girder Concrete_Bulb-Tee_Girder.

Use the following table for Semi-Deep Abutment Structure

(B3.16)

Table of Slab on Semi-Deep Abutment Quantities

Estimated Quantities for Slab on Semi-Deep Abutment		
Item		Total
Reinforcing Steel (Epoxy Coated)	pound	
Concrete	cu. yard	

Omit parts underlined when not applicable.

ESTIMATED QUANTITIES TABLES (CONT.)

Alternate Barrier Curb with Overhang

One of the following tables shall be placed on the design plans under the Table of Estimated Quantities.

Steel Structures

(B3.17)

Estimated Quantities for Alternate Slabs				
Type of Slabs	Slab & S.B.C. on Steel			
	Reinforcement (pound)		Concrete (cu. yard)	
	Epoxy	Uncoated	B-1	B-2
Cast-in-Place Conventional Forms				
P/C P/S Panels with Conventional Overhang				
P/C P/S Panels with P/C Concrete Overhang				

Prestressed I-Girder Structures

(B3.18)

Estimated Quantities for Alternate Slabs				
Type of Slabs	Slab & S.B.C. on Conc. I-Girder			
	Reinforcement (pound)		Concrete (cu. yard)	
	Epoxy	Uncoated	B-1	B-2
Cast-in-Place Conventional Forms				
P/C P/S Panels with Conventional Overhang				
P/C P/S Panels with P/C Concrete Overhang				

Prestressed Bulb-Tee Structures

(B3.18.1)

Estimated Quantities for Alternate Slabs				
Type of Slabs	Slab & S.B.C. on Conc. Bulb-Tee Girder			
	Reinforcement (pound)		Concrete (cu. yard)	
	Epoxy	Uncoated	B-1	B-2
Cast-in-Place Conventional Forms				
P/C P/S Panels with Conventional Overhang				
P/C P/S Panels with P/C Concrete Overhang				

(Place the following note with structures that use the precast alternate barrier curb with overhang.)

(B3.19)

Concrete and reinforcing for the Cast-In-Place Barrier curbs, for C.I.P. Slab and the P/C P/S Panel with conventional overhang options are included in the Table of Estimated Quantities for Alternate Slabs.

Omit parts underlined when not applicable.

B - NOTES FOR ESTIMATED QUANTITIES

ESTIMATED QUANTITIES TABLES (CONT.)

Asphaltic Concrete Overlays

The following table shall be placed under the Table of Estimated Quantities on the design plans for asphaltic concrete overlays.

Quantity for Asphalt Binder shall be accurate to the nearest 0.1 ton.
Quantity for Mineral Aggregate shall be accurate to the nearest 1 ton.
Quantity for SMA Fibers shall be accurate to the nearest 1 pound.

(B3.20)

Estimated Quantities for Alternate Asphaltic Concrete Wearing Surface				
Type of Wearing Surface	Asphaltic Binder (ton)	Mineral Aggregate (ton)	SMA Fibers (pound)	Mix Used (✓)
SP125HBSM Mix ✳				
SP125MCSM Mix ✳				
SP125HBLP Mix ✳			N/A	
SP125MCLP Mix ✳			N/A	

MoDOT construction personnel shall complete column labeled "Mix Used (✓)".

Type ✳✳ asphalt binder is required in the asphaltic concrete mix for the bridge deck overlay.

✳ The "SP" designates a superpave mixture; the "125" indicates the nominal mixture aggregate size is 12.5 mm; the "HB" designates if the mix level is for heavy duty route, the "SM" indicates Stone Mastic Asphalt, the "MC" is for medium or light duty route; and the "LP" indicates the mixture contains limestone/porphyry. See the Design Layout for the type of Superpave mixture required.

✳✳ See the Design Layout for the asphalt binder required.

Place the following notes under the "Estimated Quantities" Table when seal coat is specified on the design layout.

(B3.21)
The polymer modified asphalt shall be applied at a rate of 0.35 gallon per sq. yard.

(B3.22)
The cover aggregate shall be applied at a rate of 0.0125 ton per sq. yard.

C - NOTES FOR BILL OF REINFORCING STEEL

Place the following notes below or near the "Bill of Reinforcing Steel" when appropriate.

(C1.1)
Same marks used for unlike bars on different units
Bars in the above units are to be billed and tagged separately.

(C1.2)
Incomplete bill (Or bill for different units placed on different sheets)
See Sheet No. __ for bill of reinforcing steel for _____.

BENDING BY CRSI STANDARDS

(C1.3)
All standard hooks and bends other than 180 degree are to be bent with same procedure as for 90 degree standard hooks.

(C1.4)
Hooks and bends shall be in accordance with the procedures as shown on this sheet.

(C1.5)
Nominal lengths are based on out to out dimensions shown in bending diagrams and are listed for fabricators use. (Nearest inch)

(C1.6)
Payweights are based on actual lengths.

(C1.7)
Unless otherwise noted, diameter "D" is the same for all bends and hooks on a bar.

(C1.8)
E = Epoxy coated reinforcement.

(C1.9)
S = Stirrup.

(C1.10)
X = Bar is included in substructure quantities.

(C1.11)
Actual lengths are measured along centerline bar to the nearest inch.

(C1.12)
V = Bar dimensions vary in equal increments between dimensions shown on this line and the following line.

(C1.13)
No. ea. = Number of bars of each length.

(C1.14)
Four angle or channel spacers are required for each column spiral. Spacers are to be placed on inside of spirals. Length and weight of column spirals do not include splices or spacers.

(C1.15)
Reinforcing steel (Grade 60) fy = 60,000 psi.

C - NOTES FOR BILL OF REINFORCING STEEL

EPOXY COATED REINFORCING STEEL

Note to Detailer: All reinforcement in the slab and above, and all reinforcement that extends into the slab, shall be epoxy coated; Also, any wing reinforcement that extends into the safety barrier curb shall be epoxy coated.

(Two additional reinforcing bars of each bar size that is required to be epoxy coated, should be included in the bar bill for test purposes. These additional bars should be added to one of the required bar marks and not as a special bar. Test bars should, preferably, be 10 feet or more in length. If a bar 10 foot long cannot be found, use the bar with the largest available straight section.

(C1.16)
Two additional (1) are included in bar bill for testing.

(1) Bar mark of bars for which additional bars have been included.

C - NOTES FOR BILL OF REINFORCING STEEL

PRESTRESSED CONCRETE I-GIRDERS, DOUBLE TEE GIRDERS AND PRESTRESSED PANELS

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" or under the heading "Reinforcing Steel" when appropriate.)

(C1.17)
All dimensions are out to out.

(C1.18)
Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

(C1.19)
Actual lengths are measured along centerline of bar to the nearest inch.

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" for Prestressed Concrete I-Girders only.)

(C1.20)
Minimum clearance to reinforcing shall be 1".

(C1.21)
All reinforcement shall be Grade 60.

(C1.22)
The two D1 bars may be furnished as one bar at the fabricator's option.

(Place the following notes below or near the table "Bill of Reinforcing Steel - Each Girder" for Double-Tee Prestressed Concrete Girders only.)

(C1.23)
Minimum clearance to reinforcing shall be 1", except for 4 x 4 - W4 x W4 and U2 bar. (✳)

(C1.24)
All S and U reinforcing bars shall be epoxy coated.

(C1.25)
All reinforcement shall be Grade 60.

(Place the following notes with the above appropriate notes for prestressed panels.)

(C1.26)
Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise shown.

(C1.28)
If U1 bars interfere with placement of slab steel, U1 loops may be bent over, as necessary, to clear slab steel.

(C1.29)
Welded wire fabric or welded deformed bar mats providing a minimum area of reinforcing perpendicular to strands of 0.22 sq. in./ft., with spacing parallel to strands sufficient to insure proper handling, may be used in lieu of the #3-P2 bars shown. Wire or bar diameter shall not be larger then 0.375 inches. The above alternative reinforcement criteria may be used in lieu of the #3-P3 bars, when required, and placed over a width not less than 2 feet.

✳ Add U2 bar for skewed structures only.

Omit parts underlined when not applicable.

C - NOTES FOR BILL OF REINFORCING STEEL

PRESTRESSED CONCRETE I-GIRDERS, DOUBLE-TEE GIRDERS AND PRESTRESSED PANELS (CONT.)

(Place the following notes with the preceding appropriate notes for prestressed panels.)

(C1.30)
The reinforcing steel shall be tied securely to the 3/8" Ø strands with the following maximum spacing in each direction:
#3-P2 bars at 16 inches.
Welded wire fabric or welded deformed bar mats at 24 inches.

(C1.31)
Tie the #3-U1 bars to the #3-P2 bars, to the welded wire fabric or the welded deformed bar mats at about 36 inch centers.

MECHANICAL BAR SPLICES

(Place the following note near mechanical bar splice detail.)

(C1.40)(*)
The contractor shall use a mechanical bar splice for _____ bars at the specified location. The total bar lengths for _____ bars shown in the Bill of Reinforcing Steel are determined based on the end of the bars being located flush to the face of the construction joint. Extra bar lengths from that specified in the bar list may be required depending on the specific splice system to be used. No payment will be made for additional bar lengths added. See job special provisions for additional requirements of mechanical bar splices. Mechanical bar splices for epoxy coated bars shall be epoxy coated.

(*) Use mechanical bar splices when clearances do not allow for lap splices.

E – NOTES FOR GENERAL ELEVATION AND PLAN

EXCAVATION AND FILL

Remove Old Roadway Fill Under Structure (When specified on the Design Layout.)

(E1.1)
Old roadway fill under ends of bridge shall be removed to natural ground line or elevation _____. Payment will be made at the contract unit price for Roadway Excavation.

Removal of Roadway Fill at Side (When specified on the Design Layout.)

(E1.2)
Old roadway fill on the left right shall be removed to the natural ground line for the length of the new bridge as roadway excavation.

Bridge End Fills Having Passive Pressure

(E1.3)
For passive pressure fill requirements, see Special Provisions.

Fill at Pile Cap End Bents (All pile cap end bents)

(E1.4)
Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete approach (✳) beam within the limits of the structure and for not less than 25′ in back of the fill face of the end bents before piles are driven for any bents falling within the embankment section.

✳ Applies to Semi-Deep Abutment.

E – NOTES FOR GENERAL ELEVATION AND PLAN

SPREAD FOOTING

The following table is to be placed on plans and filled out as indicated for spread footings or pedestal pile.

Table of spread footings

(E2.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Footing Data					
Bent No.	1 (Except detached wing walls)	1 (Detached wing walls only)	2	3	4
Foundation Material	Shale	Shale	Rock		
Design Bearing ton/sq. foot	5.1	3.5	10.3		

Shallow Footings
(When specified on the Design Layout.)

(E2.2)
In no case shall footings of bents no. _ and _ be placed higher than elevations shown elevations _____.

Pedestal Pile
(When specified on the Design Layout or when required by design.)

(E2.3)
In no case shall bottom of pedestal pile be placed higher than elevations shown.

Omit parts underlined when not applicable.

E – NOTES FOR GENERAL ELEVATION AND PLAN

The following tables are to be placed on the design plans and filled out as indicated.

POINT BEARING PILE TABLE

(E3.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile Data						
Bent No.		1 (Except detached wing walls)	1 (Detached wing walls only)	2	3	4
Pile Type and Size		HP10X42	HP10X42	HP15X53	HP12X53	HP10X42
Number		4	8	5	5	4
Approximate Length	foot	40	35	50	70	80
① Design Bearing	ton	35	25	60	60	35
Hammer Energy Required	foot-pound	7,900	7,900	14,000	14,000	10,100

Minimum energy requirement of hammer is based on plan length and design bearing value of piles.

All piles shall be driven to practical refusal.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for point bearing piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru VI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E3.2)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E3.3)
Prebore to natural ground line.

(Use the following note when pile point reinforcement is required)

(E3.4)
Manufactured pile point reinforcement shall be used on all piles in this structure at Bents___and__.

Omit parts underlined when not applicable.

E – NOTES FOR GENERAL ELEVATION AND PLAN

The following tables are to be placed on the design plans and filled out as indicated.

POINT BEARING PILE AND SPREAD FOOTING TABLE

(E3.5)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile and Footing Data						
Bent No.		1 (Except detached wing walls)	1 (Detached wing walls only)	2	3	4
① Bearing Pile	Pile Type and Size	HP10X42	HP10X42			
	Number	4	8			
	Approximate Length foot	40	35			
	Design Bearing ton	35	28			
	Hammer Energy Required foot-pound	7,900	7,900			
Spread Footings	Foundation Material			Rock	Rock	Rock
	Design Bearing ton/sq. foot			9.2	9.4	8.2

Minimum energy requirement of hammer is based on plan length and design bearing value of piles.

All piles shall be driven to practical refusal.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for point bearing piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru VI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E3.6)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E3.7)
Prebore to natural ground line.

(Use the following note when pile point reinforcement is required)

(E3.8)
Manufactured pile point reinforcement shall be used on all piles in this structure at Bents___and__.

Omit parts underlined when not applicable.

E – NOTES FOR GENERAL ELEVATION AND PLAN

FRICTION PILES

The following table is to be placed on the design plans and filled out as indicated. When steel pile are used as friction pile, use the table but leave out "Type" and "Pile Standard". Friction piles are not to be driven to refusal.

Friction Pile Table

(E4.1)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile Data						
	Bent or Pier No.	1 (Except detached wing walls)	1 (Detached wing walls only)	2	3	4
	Type	Trestle	Trestle	Trestle	Trestle	Trestle
	Kind	CIP	CIP	CIP	CIP	CIP
②	Number	4	8	8	8	4
	Approximate Length foot	55	35	40	40	55
①	Design Bearing ton	25	20	32	32	25
	Min. Tip Penetration elev.	500.0	500.0	490.0	490.0	500.0
	Pile Standard	702.02	702.02	702.02	702.02	702.02
	Hammer Energy Required foot-pound	8,000	8,000	8,000	8,000	8,000

Minimum energy requirement of hammer is based on plan length of piles.

All piles shall be driven to the minimum penetrations and to not less than the design bearings noted.

② This number should not include test piles. If test piles are specified, place an ✳ beside the number of piles at the bents indicated.

① For bridges in Seismic Performance Categories B, C and D, the design bearing values for friction piles given in the table should be the larger of the following two values:

1. Design bearing value for AASHTO group loads I thru vI.
2. Design bearing for seismic loads / 2.0

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E4.2)

Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note prebore is required and the natural ground line is erratic.)

(E4.3)

Prebore to natural ground line.

(Use the following note when test piles are required.)

(E4.4)

✳ _ concrete test piles shall be driven in permanent position, one for each bents, at bents no. __, __ and ___.

(Use the following note when CIP piles are used in Seismic Performance Categories B, C, or D.)

(E4.5)

Fluted type cast-in-place pile shall not be permitted.

Omit parts underlined when not applicable.

E – NOTES FOR GENERAL ELEVATION AND PLAN

FRICTION PILES – (CONT.)

(E4.5.1)

Manufactured pile point reinforcement shall be used on all piles in this structure at Bents _____ and _____. See Special Provisions.

FRICTION PILES – APPROVED ALTERNATE

When "cast-in-place piles or approved alternate" is specified on the Design Layout, the following table is to be placed on the design plans and filled out as indicated.

Approved alternate piles are not allowed in Seismic Performance Categories B, C and D.

Friction Pile Table – Approved Alternate

(E4.6)(Example: Use the underlined parts for bridges having detached wing walls at end bents only.)

Pile Data						
Bent or Pier No.		1 (Except detached wing walls)	1 (Detached wing walls only)	2	3	4
Type		Foundation	Foundation	Foundation	Foundation	Foundation
Kind		CIP	CIP	CIP	CIP	CIP
② Number		4	8	8	8	4
Approximate Length	foot	55	55	40	40	55
Design Bearing	ton	25	20	32	32	25
Min. Tip Penetration	elev.	500.0	500.0	490.0	490.0	500.0
Pile Standard		702.02				
Hammer Energy Required	foot-pound	8,000	8,000	8,000	8,000	8,000

Minimum energy requirement of hammer is based on plan length of piles.

All piles shall be driven to the minimum penetrations and to not less than the design bearings noted.

② The number should not include test piles. If test piles are specified, place a ** beside the number of piles at the bents indicated.

(Use the following note when the cast-in-place concrete pile option is allowed. For notes pertaining to coating of sway bracing, see Section 4, Part A – General Notes, Coating.)

(E4.9)

W8 x 18 bracing for intermediate bents no. _ thru _ shall be used only if cast-in-place concrete piles are furnished. No direct payment will be made for furnishing, installing or coating of bracing.

Omit parts underlined when not applicable.

E - NOTES FOR GENERAL ELEVATION AND PLAN

FRICTION PILES - APPROVED ALTERNATE (CONT.)

(Use the following note when prebore is required and the natural ground line is not erratic.)

(E4.10)
Prebore for piles at Bents _ and__ to elevations _____ and _____, respectively.

(Use the following note when prebore is required and the natural ground line is erratic.)

(E4.11)
Prebore to natural ground line.

(Use the following note when test piles are required.)

(E4.12)
** _ concrete test piles shall be driven in permanent position, one for bents no. _____.

(Use the following note when CIP piles are used in Seismic Performance Categories B, C, or D.)

(E4.13)
Fluted type cast-in-place pile shall not be permitted.

E – NOTES FOR GENERAL ELEVATION AND PLAN

MISCELLANEOUS

Horizontal curves (Bridges not of box culvert type)

(E5.1)

All bents are parallel.

Boring Data

(Place the following note on the Front Sheet when borings are provided)

(E5.2)

"⊕" Indicates location of borings.

Notice and Disclaimer Regarding Boring Log Data

The locations of all subsurface borings for this structure are shown on the bridge plan sheet(s) for this structure. Boring data for the numbered locations is shown on sheet(s) no. _____. The boring data for all locations indicated, as well as any other boring logs or other factual records of subsurface data and investigations performed by the department for the design of the project, is available from the Project Contact upon written request as outlined in the Project Special Provisions. No greater significance or weight should be given to the boring data depicted on the plan sheets than is subsurface data available from the district or elsewhere.

The Commission does not represent or warrant that any such boring data accurately depicts the conditions to be encountered in constructing this project. A contractor assumes all risks it may encounter in basing its bid prices, time or schedule of performance on the boring data depicted here or those available from the district, or on any other documentation not expressly warranted, which the contractor may obtain from the Commission.

(Place the following note on all Retaining Wall Plans)

(E5.3)

The boring logs or other factual records of subsurface data and investigations performed by the department for the design of this project is available from the Project Contact upon written request as outlined in the Project Special Provision.

(Place the following note on the Boring Data Sheet)

(E5.4)

For location of borings see sheet no. _.

Omit parts underlined when not applicable.

E – NOTES FOR GENERAL ELEVATION AND PLAN

MISCELLANEOUS (CONT.)

Final clearance – Bridges over railroads

(E5.5)
Place an (✳) and the following note on the front sheet of bridge plan, for location of the (✳), see Bridge Manual Section 2.4, page 1-1.

(✳) Final vertical clearance from top of rails to bottom of superstructure shall be at least (✳✳). Track elevations should be verified in the field prior to construction to determine if the final vertical clearance shown will be obtained.

✳✳ Clearance specified on the Design Layout.

Seal Course
(Use the following note when Seal Course is specified on the Design Layout.)

(E5.6)
Seal course is designed for a water elevation of _____.

(Use the following note when the specified elevation for footings is different for Seal Course used compared to Seal Course omitted)

(E5.7)
If the seal course is omitted, by the approval of the engineer, then the bottom of footing shall be placed at elevation _____ and payment will be made for materials required to lengthen columns and footings.

Footing length at elevation __(1)__ shall be ___(2)___.

(1) Elevation as shown on the Design Layout.

(2) Increase footing length as required by design.

G – NOTES FOR SUBSTRUCTURE

END BENTS

Expansion Device at End Bents

(G1.1)

Top of backwall and expansion device for end bents no. _____ shall conform to the Crown of Roadway slab. Backwall above upper construction joints shall not be poured until the superstructure slab has been poured in the adjacent span.

(G1.1.1)

All concrete above the upper construction joint in backwall shall be Class B-2.

Abutments with Flared Wings

(G1.2)

Longitudinal dimensions shown for bar spacing in the developed elevations are measured along front face of abutments.

Stub Bents

(G1.3)

Safety barrier curbs, parapets and end post shall not be poured until the slab has been poured in the adjacent span.

Stub Bents Embedded in Rock or on Footings

(G1.4)

Rock shall be excavated to provide at least 6" of earth under the beam and wings.

End Bents with Turned-Back Wings

(G1.5) (Use the following note for Non-Integral End Bents only.)

Field bending shall be required at wings for (*) H___ bars in backwalls for skewed structures and for F___ bars when necessary to conform to slope of wing.

(G1.6)

For reinforcement of the safety barrier curb see sheet no. __.

Integral End Bents

(G1.7)

Bend F___ bars in field to clear girders.

(G1.7.1)

All vertical reinforcing bars in the substructure beams or caps shall be field adjusted to clear piles by at least 1-1/2".

(G1.8)

All concrete in the end bent above top of beam and below top of slab shall be class B-2.

(G1.8.1)

Use the following note for structures having detached wing walls at end bents and there is no Reinforcing Steel (Epoxy Coated) listed in the Estimated Quantities.

The top two epoxy bars in the detached wing walls shall be included with the Superstructure Quantities for Slab on Steel Concrete I-Girder Concrete Bulb-Tee Girder.

(G1.9)

Strands at end of girder shall be field bent or, if necessary, cut in field to maintain 1-1/2" minimum clearance to fill face of end bent.

Integral End Bents (Steel structure without steel diaphragms at end bents)

(G1.10)

Concrete diaphragms at the integral end bents shall be poured a minimum of 12 hours before the slab is poured.

* Size of H-bars.

Omit parts underlined when not applicable.

G - NOTES FOR SUBSTRUCTURE

END BENTS (CONT.)

Ground Line Within Semi-Deep Abutments
(G1.11)
In no case shall the earth within Abutments No. _ and _ be above the ground line below. Forms supporting the abutment slab may be left in place.

Pile Variation for Semi-Deep Abutments
(G1.12)
The maximum variation of the head of the pile and the battered face of the pile from the position shown on the plans shall be not more than 2 inches for pile under Abutments No. _ and _.

Protective Coating for Steel Shells and Structural Steel Piles for Semi-Deep Abutments
(G1.13)
Exposed steel piles steel pile shells within the abutment shall be coated with a heavy coating of an approved bituminous paint.

Expansion Device at Semi-Deep Abutments
(G1.14)
Top of abutment slab and expansion device for Abutments No. _____ shall conform to crown of roadway slab.

All Substructure Sheets with Bearing Anchor Bolts
(G1.15)
All reinforcing bars in the tops of substructure beams or caps shall be spaced to clear anchor bolt wells for bearings by at least 1/2".

Deadman Anchors
(G1.16)
Construction sequence:

(G1.17)
Construct end bent with anchor tees in place.

(G1.18)
Construct deadman with anchor tees in place.

(G1.19)
Machine compact fill up to elevation of (*)" Ø rod and turnbuckle.

(G1.20)
Install (*)" Ø rod, clevis and turnbuckle assembly.

(G1.21)
Tighten turnbuckle until snug.

(G1.22)
Hand compact fill for 12" (min.) over (*)" Ø rod and turnbuckle.

(G1.23)
Machine compact remaining fill.

(*) Size of rod.

Omit parts underlined when not applicable.

END BENTS (CONT.)

Vertical Drain at end Bents

(G1.30)

Drain pipe may be either 6″ diameter corrugated metallic-coated steel pipe underdrain, 4″ diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4″ diameter corrugated polyethylene (PE) drain pipe.

(G1.31)

Place drain pipe at fill face of end bent and slope to lowest grade of ground line, also missing the lower beam of end bent by 1-1/2″. (See elevation at end bent.)

(G1.32)

Perforated pipe shall be placed at fill face side at the bottom of end bent and plain pipe shall be used where the vertical drain ends to the exit at ground line.

G - NOTES FOR SUBSTRUCTURE

SUBSTRUCTURE QUANTITY TABLE

(G1.35)

Substructure Quantity Table for Bent No.		
Item		Quantity
Class 1 Excavation	cu. yard	x
Structural Steel Pile (in.)	linear foot	x
✳ Class B Concrete (Substructure)	cu. yard	x
Reinforcing Steel (Bridges)	pound	x

✳ Items shown are for example only, use actual items and quantities for each bent.

(G1.36)
Note: These quantities are included in the estimated quantities table on sheet no. __.

Note to Detailer:

Place substructure quantity table on right side of substructure bent sheet.

The substructure quantity tables replace the estimated quantities for substructure sheet.

INTERMEDIATE BENT

Use the following note at all fixed intermediate bents on prestressed girder bridges with steps of 2″ or more.

(G1.40)
For steps 2″ or more, use 2-1/4″ x 1/2″ joint filler up vertical face.

Use the following note when vertical column steel is hooked into the bent beam.

(G1.41)
At the contractor's option, the hooks of V-Bars embedded in the beam cap may be oriented inward or outward for Seismic Category A. Bending the hook outward, away from the column core, is not allowed for Seismic Category B, C, or D.

Place the following note on plans when using Optional Section for Column-Web beam joints.

(G1.42)
At the contractor's option, the details shown in Optional Section _-_ may be used for Column-Web Beam or Tie Beam at Intermediate Bent No. _. No addtional payment will be made for this substitution.

G - NOTES FOR SUBSTRUCTURE

C.I.P. PILES - 20" AND 24"

(G2.1)
All concrete for cast-in-place piles shall be Class B-1.

(G2.2)
Welded or seamless steel pipes shall meet the requirements of ASTM specification A-252, Grade 2 or 3, and the 3/4" closure plates shall meet the requirements of AASHTO M183.
Grade 2 Fy = 35,000 psi.
Grade 3 Fy = 45,000 psi.

(G2.3)
Where 3/4" closure plates are required for tips of pipe piles they shall not project beyond the outside diameter of the pipe piles. Satisfactory weldments may be made by beveling tip ends of pipe or by use of inside backing rings. In either case proper gaps shall be used to obtain weld penetration full thickness of pipe.

(G2.4)
Splice details for cast-in-place concrete piles shall be in accordance with the manufacturer's recommendations.

(G2.5)
All splices of shells for cast-in-place concrete piles shall be made watertight and to the full strength of the shell above and below the splice to permit hard driving without damage. All shells damaged during driving shall be replaced without cost to the State. Shell sections used for splicing shall be at least 5'-0" in length.

(G2.6)
Waterjetting permitted with 24" or 20" piles.

H - NOTES FOR SUPERSTRUCTURE

STEEL SPANS

Plate Girders - (Shop welding)

(H1.1)✳
By approval of the engineer, the contractor may omit any shop flange splice, if desired, by extending the heavier flange plate and providing approved modifications of details at field flange splices and elsewhere as required. All cost of any required design, plan revisions or re-checking of shop drawings shall be borne by the contractor. Payweight in any case will be based on material shown on Design Plans.

(✳) To be used only with the permission of the Structural Project Manager.

Welded Shop Splices

(Place the following note near Welded Shop Splice Details.)

(H1.1.1)
Welded shop web and flange splices may be permitted when detailed on the shop drawings and approved by the engineer. No additional payment will be made for optional welded shop web and flange splices.

(H1.2)
② Weld to compression flange as located on the elevations of girder.

Add the following note to note (H1.2), only when girders are built up with A514 or A517 steel flanges.

(H1.3)
Intermaediate web stiffeners shall not be welded to plates of A514 or A517 steel.

Plate Girders with Camber

(Place the following note near the elevation of girder.)

(H1.4)
Plate girders shall be fabricated to conform to the camber diagram shown on sheet no. __.

Detail Camber Diagram with note (H1.5), Dead Load Deflection Diagram with notes (H1.6) and (H1.6.1), and Theoretical Slab Haunch with note (H1.7).

(H1.5)
Camber includes allowance for vertical curve, superelevation transition, and for dead load deflection due to concrete slab, curb, asphalt, concrete wearing surface and structural steel.

(H1.6)
____% of dead load deflection is due to the weight of structural steel.

(H1.6.1)
Dead load deflection includes weight of structural steel, concrete slab, and barrier curb.

H - NOTES FOR SUPERSTRUCTURE

STEEL SPANS (CONT.)

(H1.7)

____ dimensions may vary if the girder camber after erection differs from plan camber by more or less than the % of Dead Load Deflection due to weight of structural steel. No payment will be made for any adjustment in forming or additional concrete required for variation in haunching.

Note: Increase the haunch by 1/2"± more than what is required to make one size shear connector work for both the C.I.P. and the S.I.P. Options.

ASTM A709 Grade 50W Structural Steel (Uncoated)

(Place the following note near detail of bolted field splice.)

(H1.8)

Contact surfaces are to be blast cleaned in accordance with Section 712.12.2.1 of the Missouri Standard Specifications.

Structures without Longitudinal Section

(Place the following note just above slab at part section near end diaphragm and draw an arrow to the top of diaphragm.)

(H1.9)

Haunch slab to bear.

Top of End Bent Backwall (Without expansion device)

(H1.10)

Two layers of 50# roofing felt.

Section thru Spans

(Place the following note on the slab sheet when applicable.)

(H1.11)

For details of safety barrier curb parapet median bridge rail not shown, see sheet no. __.

Web Stiffeners

(H1.12)

Whenever longitudinal stiffeners interfere with bolting the diaphragms cross frames in place, clip stiffeners.

(H1.13)

Longitudinal web stiffeners shall be placed on the outside of exterior girders and on the side opposite of the transverse web stiffener plates for interior girders.

(H1.14)

Transverse web stiffeners shall be located as shown in the plan of structural steel.

(H1.15)

Intermediate web stiffener plate and diaphragm spacing may vary from plan dimensions by a maximum of 3" for diaphragm to connect to the intermediate web stiffener plate.

STEEL SPANS (CONT.)

Wide Flange Beams - (Shop Welding)

(H1.16) ✳
By approval of the engineer, the contractor may omit any shop splice if desired, by extending the heavier beam and providing an approved modification of details at the field splices. All costs of any required redesign, plan revisions or rechecking of shop drawings shall be borne by the contractor. Payweight in any case will be based on material shown on the design plans.

✳ To be used only with permission of the Structural Project Manager.

Shear Connectors

(H1.17)
Weight of _____ pound of shear connectors is included in the weight of Fabricated Structural Carbon Steel.

(H1.18)
Shear connectors shall meet the requirements of Section 1037 of the Missouri Standard Specifications.

Notch Toughness for Wide Flange Beams
(Place an ✳ with all the beam sizes indicated on the "Plan of Structural Steel".)
(Place the following note near the "Plan of Structural Steel".)

(H1.19)
✳ Notch toughness is required for all wide flange beams.

(Place an ✳ with the flange plate, pin plate or hanger bar size indicated on the "Detail of Flange Plates, Pin Plate Connection or Hanger Connection".)

(H1.20)
✳ Notch toughness is required for all welded_flange_plates pin_plates hanger_bars.

Notch Toughness for Plate Girders
(Place the following note on the sheet with the Elevation of Girder.)
(See Section 2.4, Page 12-2 for typical examples for the location of ✳✳✳ on details for plate girders.)

(H1.21)
✳✳✳ Indicates flange plates subject to notch toughness requirements.

All web plates shall be subject to notch toughness requirements.

(H1.21.1)
The flange and web splice plates shall be subject to notch toughness requirements, when notch toughness is required for flanges on both sides of splice.

(Place ✳✳✳ near the size of flange splice plates, pin plates or hanger bars and the following note near the detail of flange splice, pin plate connection or hanger connection.)

(H1.22)
✳✳✳ Indicates flange_splice_plates pin_plates hanger_bars subject to notch toughness requirements.

Structural Steel for Wide Flange Beams and Plate Girder Structures

(H1.23)
Fabricated structural steel shall be ASTM A709 Grade 36, except as noted.

Tangent Structures on Straight Grades
(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)
Plan of Structural Steel and Elevation of Stringers or Girders

(H1.24)
Longitudinal dimensions are horizontal from ℄ bearing to ℄ bearing.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

STEEL SPANS (CONT.)

Oversized Holes for Intermediate Diaphragms

Place the following note near the intermediate diaphragm detail on all tangent wide flange and plate girder structures.

(H1.26)
At the contractor's option, holes in the diaphragm plate of non slab bearing diaphragms may be made 3/16" larger than the nominal diameter of the bolt. A hardened washer shall be used under the bolt head and nut when this option is used. Holes in the girder diaphragm connection plate or transverse web stiffener shall be standard size.

Slab drain attachment holes

Place the following note near the Elevation of Girder detail for plate girders or near the plan view for Wide Flange Beams when Slab Drains are used.

(H1.27)
For location of slab drain attachment holes see Slab Drain Details sheet.

Tangent Structures on Vertical Curve Grades

(Details of part-longitudinal sections at bents and at steel joints will be required on plans for bridges on vertical curves.)

Plan of Structural Steel

Dimensions given in plan should be identical to horizontal dimensions detailed in Part-Longitudinal Sections or blocking diagram.

(H1.28)
Longitudinal dimensions are horizontal from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on Sheet no. __.

Elevation of Constant Depth or Variable Depth Stringers or Girders

(H1.29)
Longitudinal dimensions are horizontal from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on Sheet no. __.

Elevation of Safety Barrier Curb

(H1.30) (*)
Longitudinal dimensions are along top of Safety_Barrier_Curb outside_edge_of_slab parallel to grade.

Horizontally Curved Structures on Straight Grades

(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)

Plan of Structural Steel

(H1.31)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg.

(*) Use top of safety barrier curb when a handrail is used.
(Horizontal dimensions are also acceptable when a handrail is not used.)

STEEL SPANS (CONT.)

Horizontally Curved Structures on Straight Grades
(Details of Part-Longitudinal Sections at bents and at steel joints will be required on plans.)

Elevation of Stringers or Girders
(H1.32)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg.

Elevation of Safety Barrier Curb
(H1.33)
Longitudinal dimensions are arc dimensions along centerline of top of safety barrier curb top outside edge of slab parallel to grade.

Horizontally Curved Structures on Vertical Curve Grades
(Details of part-longitudinal sections at bents and at steel joints will be required on plans for bridges on vertical curves.)

Plan of Structural Steel
(H1.36)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on sheet no. __.

Elevation of Constant Depth or Variable Depth Stringers or Girders
(H1.37)
Longitudinal dimensions are horizontal arc dimensions from ℄ brg. to ℄ brg. See Part-Longitudinal Sections on sheet no. __.

Elevation of Safety Barrier Curb
(H1.38) (✳)
Longitudinal dimensions are arc dimensions along centerline of top of safety barrier curb top outside edge of slab parallel to grade.

Structures on Vertical Curve
(H1.39)
Elevations shown are at top of web before dead load deflection.

6 x 6 x 3/8 Angle Connection to Top Flange
(H1.40)
The two 3/4″ Ø high strength bolts that connect the 6 x 6 x 3/8 angle to the top flange shall be placed so the nut is on the inside of flange toward the web.

6 x 6 x 3/8 Angle Connection to Top Flange for Structures on Vertical Curve
(H1.40.1)
The 6 x 6 x 3/8 angle legs shall be adjusted to conform to the variable angle between bearing stiffener and top flange created by girder tilt due to grade requirements.

Bolted Field Splices for PLate Girders & Wide Flange Stringers
(H1.41)
Use 7/8″ Ø high strength bolts with 15/16″ Ø holes.

(✳) Use top of safety barrier curb when a handrail is used.
(Horizontal dimensions are also acceptable when a handrail is not used.)

Omit parts underlined when not applicable.

STEEL SPANS (CONT.)

Bridge Widening or New Bridge with Stage Construction

(H1.42)

Place the following note near the Plan of Structural Steel for all bridges with stage construction or bridge widening Projects.

Bolts on intermediate diaphragms and cross frames that connect girders stringers under different construction stage slab pours shall be installed snug tight, then tightened after both adjacent slab pours are completed.

H – NOTES FOR SUPERSTRUCTURE

CONTINUOUS CONCRETE SLAB STRUCTURES

Tubes for Voids

(H2.1)
Tubes for producing voids shall have an outside diameter of ①_✳_ and shall be anchored at not more than ③_✳_ centers. Fiber tubes shall have a wall thickness of not less than ②_✳_.

(✳) See the following table for ① ② ③.

(Do not show this table on plans.)

Voids	①	②	③
7″	7.0″	0.200″	4′-0″
8″	8.0″	0.200″	4′-0″
9″	9.0″	0.200″	4′-0″
10″	10.0″	0.225″	4′-0″
11″	11.0″	0.225″	4′-0″
12″	12.0″	0.225″	4′-0″
14″	14.0″	0.250″	4′-0″
15-3/4″	15.7″	0.300″	3′-0″
16-3/4″	16.7″	0.300″	3′-0″
18-3/4″	18.7″	0.300″	2′-6″
20-7/8″	20.85″	0.350″	2′-0″
21-7/8″	21.85″	0.350″	21″
22-7/8″	22.85″	0.375″	18″
24-7/8″	24.85″	0.375″	18″

H - NOTES FOR SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER STRUCTURES

General Notes: Prestressed I Girders and Double-Tee Girders

(H2.5)
Concrete for prestressed girders shall be Class A-1 with f'c = _____ psi and f'ci = _____ psi.

(H2.6)
(+) indicates prestressing strand.

(H2.7)
Use __ strands with an initial prestress force of ___ kips.

(H2.8)
Prestressing tendons shall be uncoated, seven-wire, low-relaxation strands, 1/2 inch diameter conforming to AASHTO M203, grade 270. See Section 705.4.8 of the Missouri Standard Specifications.

Place the following notes with the above general notes for Prestressed I-Girders only.

(H2.9)
Galvanize the 1/2" bearing plate (ASTM A709 Grade 36) in accordance with ASTM A123.

(H2.10)
Cost of furnishing, galvanizing and installing the 1/2" bearing plate (ASTM A709 Grade 36) and welded studs in the prestressed girder shall be included in the price bid for Prestressed Concrete I-Girder per each.

(H2.11)
Cost of 3/4" Ø coil tie rods placed in diaphragms is included in the contract unit price for Prestressed Concrete I-Girder.

(H2.12) (✳)
Exterior and interior girders are the same, except for coil ties, and coil inserts for slab drains and holes for steel intermediate diaphragms.

(H2.13)
Coil ties shall be held in place in the forms by slotted wire-setting-studs projecting thru forms. Studs are to be left in place or replaced with temporary plugs until girders are erected, then replaced by coil tie rods.

(H2.14)
All B-1 bars shall be epoxy coated.

Use the following note when the panel option is used.
Place ✳✳✳ at the top corners of Girder at Girder Dimensions Detail.

(H2.15)
✳✳✳ At contractor's option a 1-1/2" to 1-3/4" smooth finish strip is permitted to facilitate placement of joint filler for prestressed panels.

(✳) Use only when applicable.

H - NOTES FOR SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER STRUCTURES (CONT.)

General Notes: Prestressed I-Girders and Double-Tee Girders

The following note is not applicable when the number of bottom strands is equal to the number of Bent-up strands.

(H2.16)

** At the contractor's option the location for bent-up strands may be varied from that shown. The total number of bent-up strands shall not be changed. One strand tie bar is required for each layer of bent-up strands except at end bents which require one bar on the bottom layer of strands only. No additional payment will be made if additional strand tie bars are required.

Place the following notes with the above general notes for Prestressed Double-Tee Girders only.

(H2.17)

Girders shall be handled and erected into position in a manner that will not impair the strength of the girder.

(H2.18)

The vertical face of the exterior girder that will be in contact with the slab shall be roughened by sand-blasting, or other approved methods, to provide suitable bond between girder and slab.

(H2.19)

All exposed edges of concrete shall have a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H2.19A)

Payment for edge block shall be incidental to the cost of the exterior girder.

** Place 2 asterisks next to note telling which strands are bent-up.

H - NOTES FOR SUPERSTRUCTURE

PRECAST PRESTRESSED PANELS

General Notes:

(H2.20)
Concrete for prestressed panels shall be Class A-1 with f'c = 6,000 psi, f'ci = 3,500 psi.

(H2.21)
The top surface of all panels shall receive a scored finish with a depth of scoring of 1/8" perpendicular to the prestressing strands in the panels (See Special Provisions).

(H2.22)
Prestressing tendons shall be high-tensile strength uncoated seven-wire (7), low-relaxation strands for prestressed concrete conforming to AASHTO M203 Grade 270, with nominal diameter of strand = 3/8" and nominal area = 0.085 sq. in. and minimum ultimate strength = 22.95 kips (270 ksi). Larger strands may be used with the same spacing and initial tension.

(H2.23)
Initial prestressing force = 17.2 kips/strand.

(H2.24)
The method and sequence of releasing the strands shall be shown on the shop drawings.

(H2.25)
Suitable anchorage devices for lifting panels may be cast in panels, provided they are shown on the shop drawings and approved by the engineer. Panel lengths shall be determined by the contractor and shown on the shop drawings.

(H2.26)
When square end panels are used at skewed bents, it is required that the skewed portion be cast full depth. No separate payment will be made for additional concrete and reinforcing required.

(H2.27)
Use #3-P3 bars if panel is skewed 45° or greater.

(H2.28)
All reinforcement other than prestressing strands shall be epoxy coated.

H - NOTES FOR SUPERSTRUCTURE

PRECAST PRESTRESSED PANELS (PRESTRESSED STRUCTURES)

General Notes:

(H2.30)
Minimum joint filler or polystyrene bedding material thickness shall be 3/4 inch. Thicker joint filler or polystyrene bedding material may be used on one or both sides of the girder to reduce cast-in-place concrete thickness, within tolerances. No more than 2 inches total thickness of joint filler or polystyrene bedding material shall be used.

(H2.31)
The same thickness of joint filler material shall be used under any one edge of any panel except at locations where top flange thickness may be stepped. The maximum change in thickness between adjacent panels shall be 1/4 inch. The polystyrene bedding material may be cut to match haunch height above top of flange.

(H2.32)
At the contractor's option, the variation in slab thickness over prestressed panels may be eliminated or reduced by increasing and varying the girder top flange thickness. Dimensions shall be shown on the shop drawings.

(H2.33)
End panels shall be dimensioned 1" min. to 1-1/2" max. from the inside face of diaphragm.

(H2.34)
S-bars shown are bottom steel in slab between panels and used with squared end panels only.

(H2.35)
Cost of S-bars shall be included in the price bid for Slab on Concrete I-Girder per sq. yard.

(H2.36)
S-bars are not listed in the bill of reinforcing.

(H2.37)
Support from diaphragm forms is required under the optional skewed end until cast-in-place concrete has reached 3,000 psi compressive strength.

(H2.38)
Extend S-Bars 18 inches beyond the front face of end bents only.

PRECAST PRESTRESSED PANELS (PRESTRESSED STRUCTURES) (CONT.)

General Notes:

(H2.40)
Slab thickness over prestressed panels varies due to girder camber.

(H2.41)
In order to maintain minimum slab thickness, it may be necessary to raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for necessary grade adjustment.

(H2.42)
Any strand 2'-0" or shorter shall have a #4 reinforcing bar on each side of it, centered between strands. Strands 2'-0" or shorter may then be debonded at the fabricator's option.

(H2.43)
All panel support pads shall be glued to the girder. When support thickness exceeds 1-1/2 inches, the pads shall be glued top and bottom. The glue used shall be the type recommended by the panel support pads manufacturer.

(H2.44)
Precast panels may be in contact with stirrup reinforcing in diaphragms.

H - NOTES FOR SUPERSTRUCTURE

PRECAST PRESTRESSED PANELS (STEEL STRUCTURES)

General Notes:

(H2.45)
Minimum joint filler or polystyrene bedding material thickness shall be 3/4 inch, except over splice plates where minimum thickness shall be 1/4 inch. When joint filler or polystyrene bedding material is less than 1/2 inch thick over a splice plate, make the width of material at the splice the same width as panel on splice. Thicker material may be used on one or both sides of the girder to reduce cast-in-place concrete thickness, within tolerances. No more than 2" total thickness of joint filler or polystyrene bedding material shall be used.

(H2.46)
The same thickness of joint filler material shall be used under any one edge of any panel except at splices, and the maximum change in thickness between adjacent panels shall be 1/4 inch to correct for variations from girder camber diagram. The polystyrene bedding material may be cut to match haunch height above top of flange.

(H2.47)
Support from diaphragm forms is required under the optional skewed end until cast-in-place concrete has reached 3,000 psi compressive strength.

(H2.48)
End panels shall be dimensioned 1" min. to 1-1/2" max. from the inside face of diaphragm.

(H2.49)
S-bars shown are bottom steel in slab between panels and used with squared end panels only.

(H2.50)
Adjustment in the slab thickness, joint filler or polystyrene bedding material thickness, or grade will be necessary if the girder camber after erection differs from plan camber by more than the % of dead load deflection due to the weight of structural steel. No payment will be made for additional labor or materials for the adjustment.

(H2.51)
S-bars shown are used with skewed end panels, or square end panels of square structures only. The #5 S-bars shall extend the width of slab (30 inches lap if necessary) or to within 3 inches of expansion device assemblies.

(H2.52)
Cost of S-bars shall be included in the price bid for Slab on Steel per sq. yard.

(H2.53)
S-bars are not listed in the bill of reinforcing.

(H2.54)
Any strand 2'-0" or shorter shall have a #4 reinforcing bar on each side of it, centered between strands. Strands 2'-0" or shorter may then be debonded at the fabricator's option.

(H2.55)
All panel support pads shall be glued to the girder. When support thickness exceeds 1-1/2 inches, the pads shall be glued top and bottom. The glue used shall be the type recommended by the panel support pads manufacturer.

PRECAST PRESTRESSED PANELS (STEEL STRUCTURES)(CONT.)

General Notes:

(H2.56)

Precast panels may be in contact with stirrup reinforcing in diaphragms.

H - NOTES FOR SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER STRUCTURE

Place the following note near diaphragm details.

(H2.57)
Diaphragms at intermediate bents shall be built vertical.

Slab Haunching
Use this note for all prestressed "double-tee" girder structures, except 32'-10" and 38'-10" (Unsymmetrical) roadways.
(H2.58)
The slab thickness varies from (1) to (2) within the parabolic crown.

(1) Minimum slab thickness.
(2) Minimum slab thickness minus 3/16".

Place the following table with camber diagram.

(H2.59)
Conversion factors for girder camber

0.1 pt. = 0.314 x 0.5 pt.
0.2 pt. = 0.593 x 0.5 pt. Use with spans 75' and
0.3 pt. = 0.813 x 0.5 pt. greater in length.
0.4 pt. = 0.952 x 0.5 pt.

0.25 pt. = 0.7125 x 0.5 pt.

Use with spans less than 75' in length.

Place the following note near the slab haunching diagram.

(H2.60)
If girder camber is different from that shown in the camber diagram, it shall be necessary to adjust the slab haunches(*), increase the slab thickness or raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for variation in haunching, slab thickness or grade adjustment.

(H2.61)
Concrete in the slab haunches is included in the Estimated Quantities for Slab on Steel Slab on Concrete I-Girders.

Use the following note with non-integral bents for prestressed bridges only.

(H2.62)
Prestressing strands at End Bents No. _ and _ and Intermediate Bents No. _ and _ shall be trimmed to within 1/8 inch of concrete if exposed, or 1 inch of concrete if encased. Exposed ends of girders shall be given 2 coats of an asphalt paint. Ends of girders which will be encased in concrete diaphragms shall not be painted.

* Omit on double-tee structures.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER STRUCTURE (CONT.)

(H2.64)
(✳) In lieu of 2-1/2" outside diameter washers, contractor may substitute a 3/16" (Min. thickness) plate with four 15/16" Ø holes and one hardened washer per bolt.

(H2.65)
(✳✳) These bolts shall be tightened to provide a tension of one-half that specified by Section 712.10.2 of the Missouri Standard Specifications. A325 bolts may be substituted for and installed in accordance with the requirements for the specified A307 bolts.

(H2.66)
All diaphragm materials including bolts, nuts, and washers shall be galvanized.

(H2.67)
Fabricated structural steel shall be ASTM A709 Grade 36 except as noted.

(H2.68)
Payment for furnishing and installing steel intermediate diaphragms shall be included in the contract unit price for Prestressed Concrete I-Girders.

(H2.69)
Shop drawings will not be required for steel intermediate diaphragms and angle connections.

Place the following note on the Prestressed I Girder sheet.

(H2.70)
The 1-1/2" Ø holes shall be cast in the web for steel intermediate diaphragms. Drilling is not allowed.

Place the following note on the Prestressed I Girder sheet for stream crossing only.

(H2.71)
Place vent holes at or near upgrade 1/3 point of girders and clear reinforcing steel or strands by 1-1/2" minimum and steel intermediate diaphragms bolt connection by 6" minimum.

Place the following notes on the Prestressed Double-Tee Girder slab sheet.

(H2.80)
Slab thickness to be adjusted for any difference in girder camber from that shown in camber diagram. Concrete in the slab is included in the estimated quantities as class B-2 concrete.

(H2.81)
The slab is to be built parallel to grade and to a minimum thickness of _____" (Except varies from _____" to _____" within parabolic crown).

Note: For the location of (✳) and (✳✳), see Bridge Manual Section 3.55.

H - NOTES FOR SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER STRUCTURE (CONT.)

Place the following notes with the appropriate prestressed "double-tee" girder general notes:.

(H2.82)
In order to maintain minimum slab thickness it may be necessary to raise the grade uniformly throughout the structure. No payment will be made for additional labor or materials required for variation in thickness or necessary grade adjustment.

(H2.83)
See girder sheet for girder camber diagram.

(H2.84)
Lifting loops: Provide lifting loops in each end of double-tee girder, located near center of stem, 2 feet from each end.

(H2.85)
Welded wire fabric: Adequate reinforcing other than the specified welded wire fabric may be used with the approval of the engineer.

Use the following notes when a prestressed "double-tee" girder is used with a thrie beam bridge rail.

(H2.86)
See slab sheet for spacing of rail posts.

(H2.87)
See thrie beam rail sheet for details of bolt spacing at rail posts and anchor bolt lengths.

H – NOTES FOR SUPERSTRUCTURE

TYPE "C" BEARINGS

(H3.1)
Anchor bolts for Type "C" bearings shall be 1" Ø ASTM A709 Grade 50W steel swedged bolts, with no heads or nuts and shall extend 10" into the concrete. Swedging shall be 1" less than the extension into the concrete. Anchor bolts shall be set during the placing of concrete or grouted in the anchor bolt wells prior to the erection of steel. The top of anchor bolts shall be set approximately 1/4" below the top of bearing.

(H3.2)
Anchor bolts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.3)
Weight of the anchor bolts for bearings shall be included in the weight of the Fabricated Structural Steel.

(H3.4)
"⌒" Indicates machine finish surface.

(H3.5)
Shop drawings are not required for the lead plates and/or the preformed fabric pads.

TYPE "D" BEARINGS

(H3.6)
Anchor bolts for Type "D" bearings shall be 1-1/4" Ø 1-1/2" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 12" 15" into the concrete with ASTM A194 – 2, 2H or ASTM A563 – C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F436 hardened washers for the fixed bearings and no heavy hexagon nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extension into the concrete.

(H3.7)
Anchor bolts, hardened washers and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.8)
Weight of the anchor bolts, hardened washers and heavy hexagon nuts for bearings shall be included in the weight of the Fabricated Structural Steel.

(H3.9)
"⌒" Indicates machine finish surface.

(H3.10)
Shop drawings are not required for the lead plates and/or the preformed fabric pads.

TYPE "D" BEARINGS MODIFIED

(H3.11)
Place the heads of 3/4" Ø bolts on the bottom side of the top bearing plate.

Omit parts underlined when not applicable.

H – NOTES FOR SUPERSTRUCTURE

TYPE "E" BEARINGS

(H3.15)
Anchor bolts for Type "E" bearings shall be 1-1/4" Ø 1-1/2" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 12" 15" into the concrete with ASTM A194 – 2, 2H or ASTM A563 – C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Use ASTM F436 hardened washers for the fixed bearings and no heavy hexagon nuts or hardened washers for the expansion bearings. Swedging shall be 1" less than extension into the concrete.

(H3.16)
Anchor bolts, hardened washers and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.17)
Weight of the anchor bolts, hardened washers and heavy hexagon nuts for bearings shall be included in the weight of the Fabricated Structural Steel.

(H3.18)
"⌒" Indicates machine finish surface.

(H3.19)
(1) bonded lubricant

(H3.20)
A lubricant coating shall be applied in the shop to both mating surfaces of the bearing assembly. The lubricant, method of cleaning, and application shall meet the requirements of MIL-L-23398 and MIL-L-46147 such as Dow Corning's Molykote 3402 bonded lubricant. The coated areas shall be protected for shipping and erection.

(H3.21)
Shop drawings are not required for the lead plates and/or the preformed fabric pads.

TYPE "E" BEARINGS MODIFIED

(H3.22)
Place the heads of 3/4" Ø bolts on the bottom side of the top bearing plate.

H – NOTES FOR SUPERSTRUCTURE

PTFE BEARING PADS (STEEL STRUCTURES AND/OR PRESTRESS STRUCTURES)

(H3.25)

Anchor bolts shall be 1-1/2"_Ø 2"_Ø 2-1/2"_Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 15" 18" 25" into the concrete with ASTM A194 – 2, 2H or ASTM A563 – C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

(H3.26)

All structural steel for the anchor bolts and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.27)

Neoprene Elastomeric Pads shall be 60 70 Durometer.

(H3.28)

The sole plate shall be furnished with the bearing and field welded to the stringers or girders.

Use the following note when ASTM A709 Grade 50W steel is not used for superstructure.

(H3.29)

Structural steel for sole plate shall be ASTM A709 Grade 36 and shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

Use the following note when ASTM A709 Grade 50W steel is used for superstructure.

(H3.29.1)

Structural steel for sole plate shall be ASTM A709 Grade 50W.

(H3.30)

Payment for the sole plate, anchor bolts and heavy hexagon nuts shall be included in the cost of the bearing assembly. See Special Provisions.

(H3.31)

The accepted quantity of elastomeric bearing assemblies, complete-in-place, will be paid for at the contract unit price for Type N PTFE Bearings, each.

Omit parts underlined when not applicable.

PTFE BEARING PADS (STEEL STRUCTURES AND/OR PRESTRESS STRUCTURES) (CONT.)

(H3.32)
Provide a 1/2" stopper plate to prevent loss of support due to creeping of PTFE bearings from under girder at expansion bearings.

(H3.33)
To prevent sliding, the neoprene pad shall be bonded to the bearing seat with an epoxy adhesive as approved by the bearing manufacturer for bonding neoprene to concrete.

(H3.34)
Payment for all galvanized material shall be included in the cost of PTFE Bearings per each.

(H3.34.1)
The bottom face of the 1/8" stainless steel plate that is welded to the sole plate shall be lubricated with a lubricant that is approved by the bearing manufacturer.

H – NOTES FOR SUPERSTRUCTURE

LAMINATED NEOPRENE BEARING PADS (STEEL STRUCTURES)

(H3.45)
Anchor bolts shall be 1-1/2" Ø 2" Ø 2-1/2" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 15" 18" 25" into the concrete with ASTM A194 – 2, 2H or ASTM A563 – C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

(H3.46)
All structural steel for the anchor bolts and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.47)
Neoprene Elastomeric Pads shall be 60 70 Durometer. The neoprene pad shall be bonded to the bearing seat with an epoxy adhesive as approved by the bearing manufacturer for bonding neoprene to concrete.

(H3.48)
The sole plate shall be furnished with the bearing and field welded to the stringers or girders.

Use the following note when ASTM A709 Grade 50W steel is not used for superstructure.

(H3.49)
Structural steel for sole plate shall be ASTM A709 Grade 36 and shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

Use the following note when ASTM A709 Grade 50W steel is used for superstructure.

(H3.49.1)
Structural steel for sole plate shall be ASTM A709 Grade 50W.

(H3.50)
Payment for the sole plate, anchor bolts and heavy hexagon nuts shall be included in the cost of the bearing assembly. See Special Provisions.

LAMINATED NEOPRENE BEARING PADS (STEEL STRUCTURES)(CONT.)

(H3.51)
The accepted quantity of elastomeric bearing assemblies, complete-in-place, will be paid for at the contract unit price for Laminated Neoprene Bearing Pad (Steel Structures), each.

Place the following note when a sole plate is not used.

(H3.52)
Shop drawings are not required for laminated neoprene bearings on structures without sole plates.

Laminated Neoprene Bearing Pads (Prestress Structures)

(H3.55)
Neoprene Elastomeric Pads shall be 60 70 Durometer. The neoprene pad shall be bonded to the bearing seat with an epoxy adhesive as approved by the bearing manufacturer for bonding neoprene to concrete.

Place the following note when a sole plate is not used.

(H3.55.1)
Shop drawings are not required for laminated neoprene bearings on structures without sole plates.

Place the following notes when a sole plate is used.

(H3.56)
The accepted quantity of the elastomeric bearing assemblies, complete-in-place, will be paid for at the contract unit price for Laminated Neoprene Bearing Pad (P/S Structures), each.

(H3.57)
All structural steel for the anchor bolts and heavy hexagon nuts shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.58)
Structural steel for sole plate shall be ASTM A709 Grade 36 and shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum).

(H3.59)
Anchor bolts shall be 1-1/2" Ø 2" Ø 2-1/2" Ø ASTM A709 Grade 50W steel swedged bolts and shall extend 15" 18" 25" into the concrete with ASTM A194 - 2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical) shall be provided. Swedging shall be 1" less than extension into the concrete.

(H3.60)
The sole plate shall be furnished with the bearing and field welded to the girders.

(H3.61)
Payment for the sole plate, anchor bolts and heavy hexagon nuts shall be included in the cost of the bearing assembly. See Special Provisions.

Place the following note on the appropriate bearing pad sheets.

(H3.62)
The required shim plate shall be placed between layers of elastomer and molded together to form an integral unit.

H – NOTES FOR SUPERSTRUCTURE

FLAT PLATE BEARING

(H3.65)
Flat plate bearings shall be straightened to plane surfaces.

(H3.66)
Anchor bolts shall be 1″ Ø ASTM A709 Grade 50W steel swedged bolts, 10″ long with no heads or nuts. Top of anchor bolts shall be set approximately 1/2″ above top of bottom flange.

(H3.67)
Bottom flange of beam gnd bevel plate shall have 1-1/4″ Ø holes at fixed end and 1-1/4″ x 2-1/2″ slots at expansion end.

(H3.68)
Shop drawings are not required for the lead plates and/or the preformed fabric pads.

(H3.69)
Weight of the anchor bolts for bearings shall be included in the weight of the fabricated structural steel.

ROLLED STEEL BEARING PLATES (DECK GIRDER REPAIR AND WIDENING)

(H3.70)
Material shall be ASTM A709 Grade 36 steel. Holes in 7/8″ plates for 3/4″ x 2-1/4″ and 1-1/2″ x 3″ anchors shall be made for a driving fit. After anchors are driven in place, they shall be lightly tack welded to the 7/8″ plates.

(H3.71)
Edge "A" shall be rounded (1/16″ to 1/8″ radius).

CARBON STEEL CASTING (TRUSS)

(H3.75)
All fillets shall have a 3/4″ radius.

(H3.76)
Anchor bolts shall be 1-1/2″ Ø ASTM A709 Grade 50W steel swedge bolts and shall extend 15″ into concrete with ASTM A194-2, 2H or ASTM A563 - C, C3, D, DH, DH3 heavy hexagon nuts. Actual manufacturer's certified mill test reports (chemical and mechanical)shall be provided. Furnish one 4″ Ø pin, A.I.S.I. C1042, with 2 heavy hexagon pin nuts.

(H3.77)
Material for bearing shall be carbon steel castings and will be paid for as such. Pins, anchor bolts, heavy hexagon nuts, pipe and rolled steel bearing plates will be paid for as structural carbon steel.

(H3.78)
Shop drawings are not required for the lead plates and/or the preformed fabric pads.

H – NOTES FOR SUPERSTRUCTURE

CONDUIT SYSTEM

(H4.1)
Cost of furnishing and placing anchor bolts for light standard shall be included in the contract unit price for other items.

(H4.2)(*)
All conduit shall be rigid non-metallic schedule 40 heavy wall PVC (polyvinyl chloride plastic) with 3" minimum cover in concrete. Each section of conduit shall bear the Underwriters' Laboratories, Inc., (UL) label.

(H4.2.1)
All Conduit Clamps shall be commercially available conduit clamp approved by the engineer.

(H4.3)
Shift reinforcing steel in field where necessary to clear conduit and junction boxes.

(H4.4)
Light standards, wiring and fixtures shall be furnished and installed by others.

(H4.5)
Top of light standard supports shall be made horizontal; anchor bolts shall be placed vertically.

(H4.6)
For details of light standards, underdeck lighting, and wiring, see electrical plans.

(H4.7)
Expansion fittings shall provide a minimum movement in either direction of _____ at open joints and _____at filled joints. Expansion fittings shall be equal to Carlon Electrical Construction Products or Cantex, Inc.

(H4.7.1)
Anchor bolts and nuts shall be AASHTO M314-90 Grade 55. Anchor bolts, nuts and washers shall be fully galvanized.

(*) 3" cover cannot be achieved when conduit is in the slab.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

CONDUIT SYSTEM (CONT.)

(H4.8)
All end bent and parapet, sidewalk, safety barrier curb junction boxes shall be PVC molded flush surface mounted and equal to Carlon Electrical Construction Products or Cantex, Inc. The conduit terminations shall be permanent or separable. The terminations and covers shall be of watertight construction and shall meet requirements for NEMA 4 enclosure.

Add the following note for all structures with conduit.
(H4.9)
Weepholes shall be provided at appropriated locations to drain any moisture in the conduit system.

Use the following note for conduit not encased in concrete.
(H4.10)
Conduit shall be secured to concrete with clamps at about 5'-0" cts. Concrete anchors for clamps shall be in accordance with Federal Specification FF-S-325, Group II, Type 4, Class I and shall be galvanized in accordance with ASTM -153, B695-91 Class 50 or stainless steel. Minimum embedment in concrete shall be 1-3/4". The supplier shall furnish a manufacturer's certification that the concrete anchors meet the required material and galvanizing specifications.

Use the following note for payment of Conduit System.

(H4.11)
Payment for furnishing and installing Conduit System, complete-in-place, will be paid for at the contract unit price for Conduit System on Structure, lump sum.

* Surface mount junction boxes, except on sidewalks, when existing concrete is present. Flush mount junction boxes in new concrete.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

EXPANSION DEVICES - FINGER PLATE TYPE

(H5.1) (✳)
Finger plate shall be cut with a machine guided gas torch from one plate. The plate from which fingers are cut may be spliced before fingers are cut. The surface of cut shall be perpendicular to the surface of plate. The cut shall not exceed 1/8″ in width. The centerline of cut shall not deviate more than 1/16″ from the position of centerline of cut shown. No splicing of finger plate or finger plate assembly will be allowed after fingers are cut.

(H5.2)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased ___″ for each 10° fall and decreased ___″ for each 10°F rise in temperature at installation.

(H5.3)
Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be approved stud welded anchors (C1010 thru C1020).

(H5.4)
Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.5)
Payment for furnishing, coating or galvanizing, and installing structural steel for the expansion device will be made at the contract unit price for Expansion Device (Finger Plate) per linear foot.

(H5.6)
Concrete shall be forced under and around finger plate supporting hardware, studs, angles and bars. Proper consolidation shall be achieved by localized internal vibration.

Use following notes (H5.7) thru (H5.10) with Steel Structures.

(H5.7)
All holes shown for connections to be subpunched 11/16″ Ø (shop or field drill) and reamed to 13/16″ Ø in field.

Use the following note for a steel structure intermediate bent.

(H5.8)
1-1/4″ finger plate and W14 x 43 shall be bent to conform to crown of roadway.

Use the following note for a steel structure end bent.

(H5.9)
1-1/4″ finger plate, W14 x 43 and L8 x 6 x 3/4 shall be bent to conform to crown of roadway.

(✳) For stage construction or other special cases see Structural Project Manager.

EXPANSION DEVICES - FINGER PLATE TYPE (CONT.)

Place the following note near "Plan of Slab".

(H5.10)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1"± from web of W14 x 43 at expansion device.

The following notes (5.11) and (H5.12) shall be used on Prestressed Structures.

(H5.11)
1-1/4" finger plate and L8 x 6 x 3/4 shall be bent to conform to crown of roadway.

Place the following note near "Plan of Slab".

(H5.12)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1"± from 3/4" vertical mounting plate at expansion device.

Use following notes (H5.13) thru (H5.15) for a structure with the combination of steel and prestressed girders.

(H5.13)
All holes shown for connections to be subpunched 11/16" Ø (shop or field drill) and reamed to 13/16" Ø in field.

(H5.14)
1-1/4" finger plate, W14 x 43 and L8 x 6 x 3/4 shall be bent to conform to crown of roadway.

Place the following note near "Plan of Slab".

(H5.15)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1"± from 3/4" vertical mounting plate at expansion device at P/S end, and 1"± from web of W14 x 43 at expansion device at steel end.

H - NOTES FOR SUPERSTRUCTURE

EXPANSION DEVICES - FLAT PLATE TYPE

(H5.17)
Expansion device shall be fabricated in one section, except for stage construction and when the length is over 50 feet, splicing is permissible. The expansion device shall be bent to conform to crown of roadway.

(H5.18)
Material for the expansion device shall be ASTM A709 Grade 36 structural steel. Anchors for the expansion device shall be approved stud welded anchors (C1010 thru C1020).

(H5.19)
Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.21)
Use 2-layers of 50# roofing felt between the sliding contact surfaces of beveled barrier curb bent plate and concrete barrier curb.

(H5.22)
Plan dimensions are based on installation at 60°F. The expansion gap and other dimensions shall be increased ___" for each 10° fall and decreased ___" for each 10°F rise in temperature at installation.

(H5.23)
Furnishing, coating or galvanizing and installing the expansion device and barrier curb plates shall be included in the contract unit price for Expansion Device (Flat Plate).

(H5.23.1)
Concrete shall be forced under and around flat plate, studs and angles. Proper consolidation and finishing of the concrete shall be achieved by hand finishing within one foot of the expansion device. The vertical and horizontal concrete vent holes shall be offset from each other. Do not alternate holes at the 12" spacing.

Use the following note when a flat plate expansion device is used at an end bent.

(H5.24)
Bevel plates shall be used at end bents when the grade of the slab at the expansion device is 3% or more.

Place the following note near "Plan of Slab".

(H5.25)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1" ± from vertical plate and the vertical leg of the angle at the expansion device.

Omit parts underlined when not applicable.

H – NOTES FOR SUPERSTRUCTURE

EXPANSION DEVICES – PREFORMED COMPRESSION JOINT SEAL

(H5.27)
Structural steel for expansion device shall be fabricated in one section, except for stage construction and when the length is over 50 feet, a complete joint penetration groove welded splice is permissible.

(H5.28)
The expansion device shall be bent to conform to crown and grade of roadway.

(H5.29)
Structural steel for the armored joint shall be ASTM A709 Grade 36.

(H5.31)
Plan dimensions are based on installation at 60°F.

(H5.32)
Dimension ① shall be increased ___" for each 10°F fall in temperature and decreased ___" for each 10°F rise in temperature at installation.

(H5.33)
See Special Provisions for the requirements of compression joint seal.

(H5.33.1)
Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.34)
Furnishing, coating or galvanizing and installing the structural steel armored joint and curb plates shall be included in the contract unit price for Preformed Compression Expansion Joint Seal.

(H5.35)
Neoprene extrusions shall meet ASTM D3542.

Place the following note near "Plan of Slab".

(H5.36)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1"± from vertical leg of angle at expansion device.

H - NOTES FOR SUPERSTRUCTURE

EXPANSION DEVICES - PREFORMED COMPRESSION JOINT SEAL (CONT.)

(Place the following notes near the "Tables of Transverse Bridge Seal Dimensions")

(H5.37)
Size of armor angle: Vertical leg of angle shall be a minimum of ② + 3/4". Horizontal leg of angle shall be a minimum of 3". Minimum thickness of angle shall be 1/2".

(H5.38)
If a seal size larger than that indicated on the plans is used, the movement range, the opening at 60° and all dimensions for the armor angles shall be shown on the shop drawings.

Place the following note near Part Section

(H5.39)
Concrete shall be forced under armor angle and around studs. Proper consolidation of the concrete shall be achieved by localized internal vibration.

Place the following note on skewed structures only

(H5.40)
Curb plate anchors shall be a drilled cone expansion or a cast-in-place wing type threaded insert. The minimum ultimate pullout capacity for these anchors shall be 2700 lbs in f'c = 4000 psi concrete. Lead anchors will not be permitted. Holes in the barrier curb for anchors shall not be drilled until the concrete is at least 7 days old.

H - NOTES FOR SUPERSTRUCTURE

EXPANSION DEVICES - STRIP SEALS

(H5.55)
The expansion device shall be fabricated and installed in accordance with the recommendations of the manufacturer, and as set forth in the Special Provisions.

(H5.56)
The contractor must verify all dimensions prior to fabrication.

(H5.57)
All welds shall conform to Section 712 of the Missouri Standard Specifications.

(H5.58)
Splices of steel extrusion shall develop full strength.

(H5.59)
All steel shall be ASTM A709 Grade 36, except steel extrusions shall be ASTM A709 Grade 50W or Grade 36.

(H5.60)
Neoprene Strip Seal shall meet ASTM D-2628.

(H5.61)
Anchors for the extrusions or armor shall be approved welded studs (C1010 through C1020).

(H5.62)
Payment for furnishing, coating or galvanizing and placing steel extrusions, miscellaneous structural steel, barrier curb plates, and neoprene strip seal shall be made under the contract unit price for Strip Seal Expansion Device.

(H5.62.1)
Structural steel for the expansion device and curb plate shall be coated with a minimum of two coats of inorganic zinc primer (5 mils minimum) or galvanized in accordance with ASTM A123. Anchors need not be protected from overspray.

(H5.63)
Plan dimensions are based on installation at 60°F. The gap shall be increased ___" for each 10° fall in temperature and decreased ___" for each 10° rise in temperature from the installation temperature.

Place the following note near "PLAN OF SLAB"
(H5.63.1)
Longitudinal reinforcing steel shall be placed so that ends shall not be more than 1" ± from vertical leg of the extrusion at Expansion Device.

(H5.64)
Concrete shall be forced under and around strip seal extrusions and studs. Proper consolidation of the concrete shall be achieved by localized internal vibration.

EXPANSION DEVICES - STRIP SEALS (CONT.)

Place the following note on skewed structures only.

(H5.65)
Curb plate anchors shall be a drilled cone expansion or a cast-in-place wing type threaded insert. The minimum ultimate pullout capacity for these anchors shall be 2700 lbs in f'c = 4000 psi concrete. Lead anchors will not be permitted. Holes in the barrier curb for anchors shall not be drilled until the concrete is at least 7 days old.

The following note is for Elastomeric Concrete Strip Seal Devices.

(H5.66)
Payment for furnishing, coating or galvanizing and placing the steel extrusions, miscellaneous structural steel, barrier curb plates, elastomeric concrete and neoprene strip seal shall be made under the contract unit price for Strip Seal Expasion Joint System.

H - NOTES FOR SUPERSTRUCTURE

POURING AND FINISHING CONCRETE ROADWAY SLABS

I-Beam, Plate Girder Bridges - Continuous Slabs

(H6.1)
The contractor shall pour and satisfactorily finish the slab pours at the rate given. Retarder, if used, shall be an approved type and retard the set of concrete to 2.5 hours.

Prestressed Concrete Structures - Continuous Spans

(H6.4)
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the slab pours at the rate given.

(H6.5)
End diaphragms at expansion devices may be poured with a construction joint between the diaphragm and slab, or monolithic with the slab.

(H6.6)
The concrete diaphragm at the intermediate bents and integral end bents shall be poured a minimum of 30 minutes and a maximum of 2 hours before the slab is poured.

(*) Omit underlined part on non-integral end bent.

Prestressed Double-Tee Concrete Structures

(H6.9)
The diaphragms at the intermediate and end bents shall be poured a minimum of 30 minutes and a maximum of 2 hours before the slab is poured across the diaphragm at bents.

The following note shall be used for on-system structures only.

(H6.10)
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the slab pours at not less than 25 cubic yards per hour.

H - NOTES FOR SUPERSTRUCTURE

POURING AND FINISHING CONCRETE ROADWAY SLABS (CONT.)

Solid or Voided Slab Structure - Continuous and Simple Spans

(H6.13)
The contractor shall furnish an approved retarder to retard the set of the concrete to 2.5 hours and shall pour and satisfactorily finish the roadway slab at a rate of not less than (*)cubic yards per hour.
(The contractor shall observe the transverse construction joints shown on the plans, unless he can demonstrate to the Engineer that he is equipped to pour and satisfactorily finish the roadway slab at a rate which permits a continuous pouring through some or all of these joints.)

Steel and Prestressed Structures - Simple Spans

(H6.15)
The contractor shall pour and satisfactorily finish the roadway slab at a rate of not less than 25 cubic yards per hour.

Widen, Extension, Repair, and Stage Construction

Place the following note on the plans when the closure pour is specified on the design layout.
(H6.17)(**)
Use expansive Class B-2 Concrete in closure pour (See Special Provisions). Release forms before closure pour is placed.

All Structures with Longitudinal Construction Joints

The following note shall be used on all structures with slabs wider than 54' containing a longitudinal construction joint. ① shall be replaced by the value corresponding to the total roadway width divided by the larger pour width when the construction joint is used.

(H6.18)
The longitudinal construction joint may be omitted with the approval of the Engineer. When the longitudinal construction joint is omitted, the minimum rate of pour for alternate pouring sequences shall be increased by a factor of ① .

(*) See Manual Section 3.30 - Page 1.6-1 for determining rate of pour.
(**) Semi-Deep Abutments and slab bridges do not require the forms to be released.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

SLAB DRAINS

(H7.1)
Slab drains may be fabricated of either 1/4" welded sheets of ASTM A709 Grade 36 steel or from 1/4" structural steel tubing ASTM A500 or A501.

(H7.1.1)
Slab drain bracket assembly shall be ASTM A709 Grade 36 steel.

(H7.2)
Outside dimensions of drains are 8" x 4",(*)
piece "A" = 8-3/4" x 4-3/4", piece "B" = 8" x 4".(**)

(H7.3)(**)
Piece "A" shall be cast in the concrete. Prior to placement of wearing surface, piece "B" shall be inserted into piece "A".

(H7.4)
Locate drains(*) piece "A"(**) in slab by dimensions shown in Part Section Near Drain.

(H7.5)
Shift reinforcing steel in field where necessary to clear drains.

(H7.6)
The drains, coil inserts (*) pieces "A" and "B" (**) and bracket assembly shall be galvanized in accordance with ASTM A123.

(H7.7)
All bolts, hardened washers, lock washers and nuts shall be galvanized in accordance with ASTM A153.

(H7.8)
The coil insert required bolt hole for the bracket assembly attachment shall be located on the Prestressed I-Girder Plate Girder Wide Flange Beam shop drawings.

(H7.9)
Shop drawings will not be required for the slab drains and the bracket assembly.

Place the following notes (H7.10) and (H7.11) on the prestressed I girder slab drain standard.

(H7.10)
Coil inserts shall have a concrete pull-out strength (Ultimate load) of at least 2,500 pounds in 5,000 psi concrete.

(H7.11)
The bolt required to attach the slab drain bracket assembly to the prestressed girder web shall be supplied by the prestressed I-Girder fabricator.

(*) Use with no wearing surface and p/c safety barrier curb with overhang for double-tee alternate, steel alternate and prestressed I-girder alternate.

(**) Use with wearing surface.

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

STANDARD BRIDGE ALUMINUM RAIL AND HIGH STRENGTH BRIDGE ALUMINUM RAIL

General Bridge Rail Notes

(H8.1)
All bridge rail posts shall be set normal to grade.

(H8.2)
Aluminum tube bridge rail shall be bent to conform to vertical and horizontal alignment of safety barrier curb.

(H8.3)
Aluminum washer shims between top of safety barrier curb and post base may be used for adjusting bridge rail alignment. Maximum thickness of shims shall be 1/8". Where more tilting of post is required for proper alignment, concrete bearing areas shall be ground down.

(H8.4)
All parts of the bridge rail, except anchor bolts, nuts, washers and set screws are to be aluminum material.

(H8.5)
All fillets shall be 1/4", except as noted.

(H8.6)
All drafts shall be 3 degrees, except as noted.

(H8.7)
Omit screw in side of rail post adjacent of filled joints in safety barrier curb at rail expansion points.(*)

(H8.8)
Top of safety barrier curb shall be built parallel to grade with safety barrier curb joints (except at end bents) normal to grade.

(H8.9)
All exposed edges of safety barrier curb shall have either a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H8.10)
All outside corners of aluminum posts shall have a 1/8" radius, except as noted.

(H8.11)
All rail splices shall be located near a 1/4 point between rail posts.(**)

(H8.12)
A thin coating of material shall be applied to the stainless steel headless set screws to prevent locking to aluminum post.(*) stainless steel cap screws and the stainless steel fillister head machine screws to prevent locking to aluminum post or tube.(**) The coating material shall be equal to Wynn Oil Company's "Viscotene" or Stahl Specialty Company's "PBC 516" or National Chemsearch Corporation's "Thread Eze".

(*) Use this note with a standard bridge aluminum rail.
(**) Use this note with a high strength bridge aluminum rail.

Omit parts underlined when not applicable

H - NOTES FOR SUPERSTRUCTURE

THRIE BEAM RAIL

General Notes:

(H9.2)
Panel lengths of channel members shall be attached continuously to a minimum of four posts and a maximum of six posts (except at end bents).

(H9.3)
All bolts, nuts, washers, and plates and elastomeric materials are considered as parts of the thrie beam rail for payment.

(H9.4)
All steel connecting bolts and fasteners for posts and railing, and all anchor bolts, nuts, washers, and plates shall be galvanized after fabrication. For protective coating and material requirement of steel railing, see Section 1040 of the Missouri Standard Specifications.

(H9.5)
Rail posts shall be set perpendicular to roadway profile grade and vertically in cross section, and aligned according to Section 713 of the Missouri Standard Specifications, except that the rail posts shall be aligned by the use of shims so that in the final adjustment no part shall deviate more than one inch from true horizontal alignment. The shims shall be 3" x 1-3/4" and placed between the blockout and the thrie beam rail. The thickness of the shims shall be determined by the contractor and verified by the engineer before ordering material for this work.

Use the following note only when a base plate is used.

(H9.6)
Rail posts shall be seated on elastomeric pads having the same dimensions as the post base plate and 1/16" thickness. Such pads may be any elastomeric material, plain or fibered, having a hardness (Durometer) of 50 or above, as certified by the manufacturer. Additional pads or half pads may be used in shimming for alignment. Post heights shown will increase by the thickness of the pad.

(H9.7)
At the expansion slots in the thrie beam rails and channels, tighten bolts, back off one-half turn and burr threads.

THRIE BEAM RAIL (CONT.)

General Notes: (Cont.)

(H9.8)
At the thrie beam connection to blockout on wings, tighten bolts, back off one-half turn and burr threads.

(H9.9)
Minimum length of thrie beam sections is equal to one post space.

(H9.10)
Use 5/8" Ø button-head, oval shoulder bolts with hex nuts at all slots (thickness of hex nuts = 3/8" min.).

(H9.11)
Thrie beam guard rail on the bridge shall be made of steel and shall be 12 gage.

(H9.12)
Posts, cap rail angles, base plates, channels and channel splice plates shall be fabricated from ASTM A709 Grade 36 steel and galvanized.

(H9.15)
Washers shall be used at all post bolts (between the bolt head and beam). They shall be rectangular in shape (3" x 1-3/4" x 3/16" min.) and flat with a 11/16" x 1" slot, or when necessary of such design as to fit the contour of the beam. (Use a 3" x 1-3/4" x 5/8" rectangular washer between the blockout and the thrie beam rail.)

THRIE BEAM RAIL (CONT.)

General Notes: (Cont.)

(H9.16)
Special drilling of the thrie beam may be required at the splices. (All drilling details are to be shown on the shop drawings.)

(H9.17)
Fabrication of structural steel shall be in accordance with Section 712 of the Missouri Standard Specifications.

Do not use the following note with prestress double-tee structures.

(H9.18)
Expansion splices in the thrie beam rail shall be made at either the first or second post on either side of the joint and on structure at bridge ends. When the splice is made at the second post, an expansion slot shall be provided in the thrie beam rail for connection to the first post to allow for movement.

Do not use the following note with prestress double-tee structures.

(H9.19)
In addition to the expansion provisions at these expansion joints, expansion splices in the thrie beam rail and the channel shall be provided at other locations so that the maximum length without expansion provisions does not exceed 200 ft.

Use the following note with prestress double-tee structures.

(H9.20)
Expansion splices in the thrie beam rail and the channel shall be provided at locations so that the maximum length without expansion provisions does not exceed 200 ft.

(H9.21)
Shim plates 6″ x 6″ x 1/16″ may be used between the top of the post and the channel member as required for vertical alignment.

(H9.22)
See slab sheet for rail post spacing.

(H9.23)
See Missouri Standard Plans drawing 606.00 for details not shown.

H – NOTES FOR SUPERSTRUCTURE

SAFETY BARRIER AND MEDIAN BARRIER CURB

The following notes are to be placed on the safety barrier and median barrier curb detail sheet.

(H10.1)
Top of safety median barrier curb shall be built parallel to grade with safety median barrier curb joints (Except at end bents) normal to grade.

(H10.2)
All exposed edges of safety median barrier curb shall have either a 1/2″ radius or a 3/8″ bevel, unless otherwise noted.

(H10.3)
When the safety median barrier curb is bid by linear foot, the contract unit price shall include the cost of all concrete and reinforcement, complete-in-place.

(H10.4)
Concrete in the safety median barrier curb shall be Class B-1.

The following note shall be used for safety barrier curb.

(H10.5)
Measurement of safety barrier curb is to the nearest linear foot for each structure, measured along the outside top of slab from end of wing to end of wing.

The following note shall be used for safety barrier curb near median.

(H10.6)
Measurement of safety barrier curb is to the nearest linear foot for each structure, measured along the outside top of slab from fill front face to fill front face of end bent.

The following note shall be used for median barrier curb.

(H10.7)
Measurement of median barrier curb is to the nearest linear foot for each structure, measured along top of slab from fill front face to fill front face of end bent.

The following notes shall be placed under cross-section thru safety barrier or median barrier curb.

(H10.8)
Use a minimum lap of 35″ for #5 horizontal safety median barrier curb bars.

(H10.9)
The cross-sectional area for each curb above the slab = (✳) sq. ft.

(✳) 2.28 for a 16″ safety barrier curb.
2.96 for a median barrier curb.

Omit parts underlined when not applicable.

SAFETY BARRIER AND MEDIAN BARRIER CURB (CONT.)

The following notes shall be used for double-tee structures.

(H10.10)
Coil inserts shall have a concrete ultimate pullout strength of not less than 36,000 pounds in 5,000 psi concrete and an ultimate tensile strength of not less than 36,000 pounds.

(H10.11)
Threaded coil rods shall have an ultimate capacity of 36,000 pounds. All coil inserts and threaded coil rods shall be galvanized in accordance with ASTM A153.

(H10.12)
Payment for furnishing and installing coil inserts and threaded coil rods shall be fully covered by the contract unit price for Safety Barrier Curb.

Elevation of Safety Barrier Curb

(H10.12.1)
Longitudinal dimensions are horizontal arc dimensions.

(H10.12.2)
Longitudinal dimensions are along top of safety_barrier_curb_outside edge_of_slab parallel to grade. (*)

(*) Use top of safety barrier curb when a handrail is used. (Horizontal dimensions are also acceptable when a handrail is not used.)

Omit parts underlined when not applicable.

H - NOTES FOR SUPERSTRUCTURE

OPTIONAL SAFETY BARRIER CURB - OFF-SYSTEM (DOUBLE-TEE)

General Notes:

(H10.13)
Coil insert locations shall be shown on the shop drawings of precast safety barrier curb.

(H10.14)
Coil inserts shall have a concrete ultimate pullout strength of not less than 36,000 pounds in 5,000 psi concrete and an ultimate tensile strength of not less than 36,000 pounds.

(H10.15)
Threaded coil rods shall have an ultimate capacity of 36,000 pounds. All coil inserts and threaded coil rods shall be galvanized in accordance with ASTM A153.

(H10.16)
Concrete for safety barrier curbs shall be Class B-1 with f'c = 4,000 psi.

(H10.17)
Top of safety barrier curb shall be parallel to grade with safety barrier curb joints normal to grade.

(H10.18)
All exposed edges of safety barrier curb shall have either a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H10.20)
Payment for furnishing and installing coil inserts and threaded coil rods shall be fully covered by the contract unit price for Safety Barrier Curb.

(H10.21)
When the safety barrier curb is bid by linear foot, the contract unit price shall include the cost of all concrete and reinforcement, complete-in-place.

(H10.22)
The precast safety barrier curb units shall be spaced to allow for the centering of a 1/4" joint over each intermediate bent.

(H10.23)
Measurement of safety barrier curb is to the nearest linear foot for each structure, measured along the outside top of slab from end of wing to end of wing.

OPTIONAL SAFETY BARRIER CURB - OFF-SYSTEM (DOUBLE-TEE) (CONT.)

General Notes: (Cont.)

(H10.24)
All dimensions for R-bars are out to out.

(H10.25)
Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

(H10.26)
Actual lengths of reinforcing bars are measured along centerline of bar to the nearest inch.

(H10.27)
Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise noted.

(H10.28)
All reinforcement shall be Grade 60.

H – NOTES FOR SUPERSTRUCTURE

OPTIONAL SAFETY BARRIER CURBS AT END BENTS

Use the following notes for steel, prestressed and double-tee structures.

(H10.66)
Coil insert locations shall be shown on the shop drawings of precast safety barrier curb.

(H10.67)
Coil inserts shall have a concrete ultimate pullout strength of not less than 36,000 pounds in 5,000 psi concrete and an ultimate tensile strength of not less than 36,000 pounds.

(H10.68)
Threaded coil rods shall have an ultimate capacity of 36,000 pounds.

(H10.69)
All coil inserts and threaded coil rods shall be galvanized in accordance with ASTM A153.

(H10.70)
All exposed edges of safety barrier curb shall have either a 1/2″ radius or a 3/8″ bevel, unless otherwise noted.

Use the following notes for steel and prestressed structures.

(H10.71)
Concrete for safety barrier curbs shall be Class B-1 with f′c = 4,000 psi.

(H10.72)
Payment for furnishing and installing coil inserts and threaded coil rods shall be fully covered by the contract unit price for Slab_on_Steel Slab_on_Concrete_I-Girder.

(H10.73)
Safety barrier curb at the end bents is included in the bid item for Slab_on_Steel Slab_on_Concrete_I-Girder.

(H10.74)
Top of safety barrier curb shall be parallel to grade with safety barrier curb joints normal to grade.

(H10.75)
The safety barrier curb quantities at the end bents are not included in the table of estimated quantities for alternate slabs.

OPTIONAL SAFETY BARRIER CURBS AT END BENTS (CONT.)

Use the following notes for double-tee structures.

(H10.76)
Concrete for precast safety barrier curb shall be Class B-1 with f'c = 4,000 psi.

(H10.77)
Concrete for cast-in-place safety barrier curb shall be Class B-1 with f'c = 4,000 psi.

(H10.78)
Payment for furnishing and installing coil inserts and threaded coil rods shall be fully covered by the contract unit price for Precast Safety Barrier Curb.

(H10.79)
Measurement of safety barrier curb is to the nearest linear foot for each structure, measured along the outside top of slab from end of wing to fill face of end bent.

(H10.80)
Safety barrier curb at end bents is included in the bid item for Precast Safety Barrier Curb.

H - NOTES FOR SUPERSTRUCTURE

SAFETY BARRIER CURB - SLIP FORM OPTION

Optional slip form safety barrier curb details shall be placed on all jobs (except P/S Double-tee Structures) where applicable.

Add #5 crisscross bars for slip-form option. Base the length of these bars on the shortest distance between joints and use typically on each side of joints throughout structure.

(H10.81)
Joint sealant and backer rods shall be used on all slip-form safety barrier curbs instead of joint filler.

(H10.82)
Plastic waterstop shall not be used with slip-form option.

(H10.83)
For Slip-Form Option, all sides of the safety barrier curb shall have a vertically broomed finish and the curb top shall have a transversely broomed finish.

TEMPORARY BARRIER CURB

(H10.84)
Method of attachment for the Type F Temporary Barrier shall be the Tie-Down Strap Bolt through deck.

(H10.85)
Temporary Barrier shall not be attached to the bridge.

H – NOTES FOR SUPERSTRUCTURE

MISCELLANEOUS

Construction Joint

(H11.1)
Finish each side of joint with a 1/4 inch radius edging tool.

Pin and Flat Hexagonal Nut

(H11.2)
Material: Pin = ASTM A688 (Class F)
Nut = ASTM A709 Grade 36

Plastic Waterstop

(Use in the Curb and Parapet filled joints as specified in Sec. 3.30.)

(H11.3)
Plastic waterstop shall be placed in all parapet s safety barrier curb s filled joints, except at end bents.

(H11.4)
Cost of plastic waterstop complete-in-place, shall be included in the contract unit price for Concrete Safety Barrier Curb.

Sign Supports

(H11.5)
Payment for furnishing and placing anchor bolts for sign supports shall be included in the contract unit price for other items.

(H11.6)
Payment for furnishing and erecting approximately ___ pound of steel for sign supports shall be included in the contract unit price for Fabricated Sign Support Brackets.

Plan of Slab: All Structures

(H11.8)
Longitudinal slab dimensions are measured horizontally.

H - NOTES FOR SUPERSTRUCTURE

MISCELLANEOUS (CONT.)

Pedestrian Guard Fence (Chain Link Type): General Notes

(H11.10)
Pedestrian guard fence (Chain link type) shall be in accordance with Section 1043 of the Missouri Standard Specifications, except all fabric shall have the top and bottom edges knuckled.

(H11.11)
All rail post shall be vertical. Grout of 1/2" minimum thickness shall be placed under floor plates to provide for vertical alignment of rail posts.

(H11.12)
The contract unit price per linear foot for (72 in.) Pedestrian Fence (Structures) shall include furnishing, galvanizing and erecting the fence and frame complete with 1-1/2" Ø pipe handrail, handrail brackets, anchor bolts and washers.

(H11.13)
Dimensions of pedestrian guard fence are measured horizontally.

(H11.14)
The maximum spacing allowed for the braced panels (Pull posts) is 100 ft.

(H11.15)
Connect the lower end of the 1/2" Ø rod to the end of the braced panel to which the stretcher bar is attached.

Floor - Laminated Timber

(H11.16)
Each 2" x 4" strip of laminated flooring shall be side-nailed to adjacent strips with one 40d nail every 12", alternating about 1-1/2" from top and bottom edges. Laminated flooring shall be fastened to stringers by anchor plate spaced at 12" centers on alternating sides of each stringer through truss spans and by anchor plates spaced at 12" on both sides of each stringer through end spans.

H - NOTES FOR SUPERSTRUCTURE

MISCELLANEOUS (CONT.)

Sidewalks

(H11.20)
All exposed edges of sidewalk shall have either a 1/2" radius or a 3/8" bevel, unless otherwise noted.

(H11.21)
When the sidewalk is bid by sq. foot, the contract unit price shall include the cost of all concrete and reinforcement, complete in place.

(H11.22)
Concrete in the sidewalk shall be Class B-2.

(H11.23)
Measurement of the sidewalk is to the nearest square foot for each structure, measured horizontally from the outside face of safety barrier curb to the outside edge of sidewalk and from fill front face to fill front face of end bent.

Expansion Device Movement Gauge

(H11.24)
A movement gauge shall be provided on one side of bridge at all safety barrier curb expansion joints.

(H11.25)
All steel shall be galvanized.

(H11.26)
Cost of movement gauge complete in place shall be included in the contract unit price for Safety Barrier Curb.

I - NOTES FOR REVISED STRUCTURES

WIDEN, EXTENSION AND REPAIR

General Notes: (Place with general notes)

(I1.1)
Outline of old work is indicated by dashed lines. Heavy lines indicate new work.

(I1.2)
Contractor shall verify all dimensions in field before ordering new material.

(I1.3)
Bars bonded in old concrete not removed shall be cleanly stripped and embedded into new concrete where possible. If length is available, old bars shall extend into new concrete at least 40 diameters for smooth bars and 30 diameters for deformed bars, unless otherwise noted.

Use the following note where a broken concrete surface has no new concrete against it.

(I1.4)
The area exposed by the removal of concrete and not covered with new concrete shall be coated with an approved bituminous_paint special_mortar. ①

① Use bituminous paint below ground line and special mortar above ground line.

Anchors

(Use Resin Anchors unless concrete depths are insufficient)

Resin Anchors

(I1.5)
The contractor shall use one of the resin anchor systems listed in the job special provisions. These anchor systems shall be installed according to the manufacturer's specifications, except as modified by the job special provisions.

(I1.6)
Cost of furnishing and installing the anchor system complete in place shall be included in the price bid for _____
_____**

(**) Pay Item in which anchor is embedded.

Omit parts underlined when not applicable.

I - NOTES FOR REVISED STRUCTURES

WIDEN, EXTENSION AND REPAIR (CONT.)

General Notes: (Place with general notes) (Cont.)

(I1.7)
The _✳_" diameter resin anchor systems shall have a minimum ultimate pullout strength of __✳✳__ lbs. in concrete with f'c = 4,000 psi, see Special Provisions.

✳ DIAMETER	✳✳ PULLOUT
$\frac{5}{8}$"	15,500
$\frac{3}{4}$"	20,400
$\frac{7}{8}$"	27,500
1"	33,600

Note to designer: A minimum factor of safety of 2 should be used when determining the number of anchors to be used.

(Use the following note when reinforcing steel is substituted for the threaded rod stud.)

(I1.8)
A An epoxy coated ① Grade 60 reinforcing bar __②__ long shall be substituted for the _③_ threaded rod stud.

① Bar size
② Length of bar required by design
③ Diameter of threaded rod stud

Cone Expansion Anchors

(I1.9)
Cost of furnishing and installing cone expanson anchor shall be included in the price bid for _____✳✳✳_____

✳✳✳ Pay Item in which anchors is embedded

(I1.10)
The _✳_" diameter cone expansion anchors shall have a minimum ultimate pullout strength of _✳✳__ lbs. in concrete with f'c = 4,000 psi.

✳ DIAMETER	✳✳ PULLOUT
$\frac{3}{8}$"	3,900
$\frac{1}{2}$"	7,500
$\frac{5}{8}$"	10,800
$\frac{3}{4}$"	12,000

Omit parts underlined when not applicable.

I - NOTES FOR REVISED STRUCTURES

WIDEN, EXTENSION AND REPAIR (CONT.)

Extension of Box Type Structures

(I1.11)
Bottom of top slab, top of bottom slab, and inside faces of walls shall be built flush with the old structure.

(I1.12)
Bottom of new slab shall be built flush with the bottom of slab of the old box and the height of walls varied as necessary to extend the walls into rock as specified.

Concrete Slab with Overlay

(I1.13)
In order to maintain grade and a minimum thickness of overlay as shown on plans it may be necessary to use additional quantities of overlay at various locations throughout the structure. No payment will be allowed for additional labor, materials or equipment for variations in thickness of overlay.

Replacement of Expansion Device and Adjacent Concrete

(I1.14)
Concrete overlay shall be forced into the cavity under the armor angle. Proper consolidation of the concrete shall be achieved by localized internal vibration.

(Use the following note when epoxy polymer concrete is used as the wearing surface)

(I1.14.1)
The contractor shall exercise care to ensure spillage over joint edges is prevented and that a neat line is obtained along any terminating edge of the epoxy polymer concrete.

Bridge Anchor Section - Guard Rail

(I1.15)
Where attaching bridge guard rail to an existing bridge, drill a full-length bolt hole through the end post or through the curb and deck where possible. Attach with a full-length, high strength bolt with a plate and nut.

Making End Bents Integral - Bar Lengths for Staging Purposes

(I1.16)
The _____ bars are segmented bars. The total bar lengths for H-bars shown in Bill of Reinforcing Steel allow for __ splices with a lap splice length of _____ per bar. Actual bar segment lengths to be determined by contractor to accommodate stage construction.
The contractor may use a mechanical bar splice in lieu of a lap splice. When a mechanical bar splice is used, the actual bar segment lengths will be determined by the contractor to accommodate manufacturers recommendations for installation and stage construction. The cost of furnishing and installing the bar splices shall be included in the price bid for reinforcing steel. No adjustment of the quantity of reinforcing steel will be allowed for the use of mechanical bar splices. See job special provisions for additional requirements of mechanical bar splices. Mechanical bar splices for epoxy coated bars shall be epoxy coated.

I - NOTES FOR REVISED STRUCTURES

WIDEN, EXTENSION AND REPAIR (CONT.)

Special Repair Zones

(I1.18)
Any repair in the remainder of the bridge that is within ① of Zone A shall be completed before removing old concrete in Zone A.

Replace ① with the development length of reinforcement rounded to the next highest 6".

Use the following note for structures with multi-column bents.

(I1.19)
Zones with the same letter designation may be repaired at the same time. Sequence of repairs follows zone A, zone B then zone C.

Use the following note for structures with single column bents.

(I1.20)
Zones with the same letter designation may be repaired at the same time except for the zones directly adjacent to the centerline of bent. If either of the zones adjacent to centerline of bent has a single repair area of over 10 square feet or a total repair area of over 20 square feet, that zone shall be repaired before removing concrete in the other zone of the same designation at that bent.

I - NOTES FOR REVISED STRUCTURES

THRIE BEAM RAIL

General Notes:

(I2.2)

Panel lengths of channel members shall be attached continuously to a minimum of four posts and a maximum of six posts (except at end bents).

(I2.3)

All bolts, nuts, washers, and plates and elastomeric materials are considered as parts of the thrie beam rail for payment.

(I2.4)

All steel connecting bolts and fasteners for posts and railing and all anchor bolts, nuts, washers and plates shall be galvanized after fabrication. For protective coating and material requirement of steel railing, see Section 1040 of the Missouri Standard Specifications.

(I2.5)

Rail posts shall be set perpendicular to roadway profile grade and vertically in cross section, and aligned according to Section 713 of the Missouri Standard Specifications, except that the rail posts shall be aligned by the use of shims so that in the final adjustment no part shall deviate more than one inch from true horizontal alignment. The shims shall be 3″ x 1-3/4″ and placed between the blockout and the thrie beam rail. The thickness of the shims shall be determined by the contractor and verified by the engineer before ordering material for this work.

(I2.6)

At the expansion slots in the thrie beam rails and channels, tighten bolts, back off one-half turn and burr threads.

(I2.7)

At the thrie beam connection to blockout on wings, tighten bolts, back off one-half turn and burr threads.

(I2.8)

Minimum length of thrie beam sections is equal to one post space.

(I2.9)

Use 5/8″ Ø button-head, oval shoulder bolts with hex nuts at all slots (thickness of hex nuts = 3/8″ min.).

(I2.10)

Thrie beam guard rail on the bridge shall be made of steel and shall be 12 gage.

THRIE BEAM RAIL (CONT.)

General Notes: (Cont.)

(I2.11)
Posts, cap rail angles, channels and channel splice plates shall be fabricated from ASTM A709 Grade 36 steel and galvanized.

(I2.12)
Washers shall be used at all post bolts (between the bolt head and beam). They shall be rectangular in shape (3″ x 1-3/4″ x 3/16″ min.) and flat with a 11/16″ x 1″ slot, or when necessary of such design as to fit the contour of the beam. (Use a 3″ x 1-3/4″ x 5/8″ rectangular washer between the blockout and the thrie beam rail.)

(I2.13)
Special drilling of the thrie beam may be required at the splics. (All drilling details are to be shown on the shop drawings.)

(I2.14)
Fabrication of structural steel shall be in accordance with Section 712 of the Missouri Standard Specifications.

THRIE BEAM RAIL (CONT.)

General Notes: (Cont.)

(I2.15)
Expansion splices in the thrie beam rail shall be made at either the first or second post on either side of the joint and on structure at bridge ends. When the splice is made at the second post, an expansion slot shall be provided in the thrie beam rail for connection to the first post to allow for movement.

(I2.16)
In addition to the expansion provisions at these expansion joints, expansion splices in thrie beam rail and the channel shall be provided at other locations so that the maximum length without expansion provisions does not exceed 200 ft.

(I2.17)
Contractor shall verify all dimensions in field before ordering materials.

(I2.18)
Shim plates 6" x 6" x 1/16" may be used between the top of the post and the channel member as required for vertical alignment.

(I2.19)
See slab sheet for rail post spacing.

(I2.20)
See Missouri Standard Plans Drawing 606.00 for details not shown.

J - NOTES FOR M.S.E. WALLS

GENERAL NOTES:

(J1.1)
Factor of safety shall be 2.0 for overturning, 1.5 for sliding and 2.0 for bearing.

(J1.2)
The cost of joint filler and joint seal, complete-in-place, shall be included in the contract price for Concrete Traffic Barrier (Type A C). See Roadway Plans.

(J1.3)
For seismic design the factor of safety shall be 1.5 for overturning and 1.1 for sliding.

(J1.4)
ϕ = __° for random backfill to be retained by the mechanically stabilized earth wall.

(J1.5)
ϕ = __° for foundation material the wall is to rest on.

(J1.6)
$\phi \geq 34°$ for the selected granular backfill (See Special Provisions).

(J1.7)
Design $\phi = 34°$ for the selected granular backfill.

(J1.8)
All concrete for leveling pad and coping shall be Class B or B-1.

(J1.9)
The boring logs or other factual records of subsurface data and investigations performed by the department for the design of this project is available from the Project Contact upon written request as outlined in the Project Special Provisions.

(J1.10)
Panel reinforcement shall be epoxy coated.

(J1.11)
Anchorage reinforcement shall be spaced to avoid roadway drop inlet behind wall.

(J1.12)
A filter cloth shall be placed between the selected granular backfill and the random backfill.

(J1.13)
Coping shall be required on this structure unless a small block system is used.

Omit parts underlined when not applicable.

J - NOTES FOR M.S.E. WALLS

GENERAL NOTES: (CONT.)

For Battered Walls

(J1.14)
The top and bottom elevations are given for a vertical wall. If a battered wall system is used, the height of the wall shall be adjusted as necessary to fit the ground slope and the concrete leveling pad shall be adjusted as necessary to account for the wall batter. If a fence is built on an extended gutter, then the height of the wall shall be adjusted further.

The baseline of the wall shown is for a vertical wall. If a battered wall system is used, this baseline shall correspond to Elevation _____.

For Walls Near Bridge Abutments

(J1.15)
The contractor shall coordinate construction of the wall with bridge and roadway construction. (See staging plans on bridge and roadway.) Contractor shall place soil reinforcement to avoid damage by pile driving, guardrail post installation, utility and sign foundations.

PREQUALIFIED WALL SYSTEMS

(J1.16)
Use the following note and table for walls which must be vertical or over 10 feet in height.

Use approved wall systems. (See MoDOT Internet site for an updated list of Approved Large Block Wall Systems.)

M.S.E. Wall System Used

"M.S.E. Wall System Used" to be completed by MoDOT construction personnel.

J - NOTES FOR M.S.E. WALLS

PREQUALIFIED WALL SYSTEMS (CONT.)

(J1.17)

Use the following note and table for walls which are less than 10 feet in height and are not required to be vertical.

Use approved wall systems. (See MoDOT Internet site for an updated list of Approved Wall Systems.)

M.S.E. Wall System Used

"M.S.E. Wall System Used" to be completed by MoDOT construction personnel.

APPROVED WALL SYSTEMS (CONT.)

(J1.18)
Use the following note and table in all cases for walls which are less than 10 feet in height and are not required to be vertical.

Use approved geogrids and approved wall facings. (See MoDOT Internet site for an updated list of Approved Systems.) Any combination of the aaproved geogrids and the approved wall facings are considered an approved wall system, subject to the approval of the wall manufacturer.

Geogrids Used (with Approved M.S.E Wall Facing Units)
Facing Units Used (with above Geogrid)

"Geogrid Used" and "Facing Units Used" to be completed by MoDOT construction personnel.

K - NOTES FOR APPROACH SLAB

GENERAL NOTES:

(K1.1)
All concrete for the bridge approach slab and sleeper slab shall be in accordance with Section 503 (f'c = 4,000 psi) of the Missouri Standard Specifications.

(K1.2)
All joint filler shall meet the requirements of Section 1057.2.5 of the Missouri Standard Specifications, except as noted.

(K1.3)
The reinforcing steel in the bridge approach slab and the sleeper slab shall be epoxy coated Grade 60 with Fy = 60,000 psi.

(K1.4)
Minimum clearance to reinforcing steel shall be 1-1/2", unless otherwise shown.

(K1.5)
The reinforcing steel in the bridge approach slab and the sleeper slab shall be continuous. The transverse reinforcing steel may be made continuous by lap splicing the #4 & #6 bars 18" and 26" respectively.

(K1.6)
Mechanical bar splices will be permitted and shall develop at least 125 percent of the specified yield strength of the reinforcing bars being spliced. The contractor shall furnish the Engineer the manufacturer's certification that this requirement is met and is required to follow the manufacturer's recommendation for installation.

(K1.7)
Mechanical bar splices shall be epoxy coated in accordance with Section 710 of the Missouri Standard Specifications.

(K1.8)
When a lap splice is required for the use of a mechanical bar splice, the minimum lap length shall be 40" for transverse approach slab bar splices.

(K1.9)
Hooks and bends shall be in accordance with the CRSI Manual of Standard Practice for Detailing Reinforced Concrete Structures, Stirrup and Tie Dimensions.

(K1.11)
The contractor shall pour and satisfactorily finish the bridge slab before pouring the bridge approach slabs.

K - NOTES FOR APPROACH SLAB

GENERAL NOTES: (CONT.)

(K1.12)
Longitudinal construction joints in approach slab and sleeper slab shall be aligned with longitudinal construction joints in bridge slab.

(K1.14)
Payment for furnishing all materials, labor and excavation necessary to construct the approach slab, including the timber header, sleeper slab, underdrain, Type 5 aggregate base, joint filler and all other appurtenances and incidental work as shown on this sheet, complete in place, shall be considered as completely covered under the contract unit price for Bridge Approach Slab (Bridge), per sq. yard.

(K1.15)
For Concrete Approach Pavement details, see roadway plans.

(K1.17)
See Missouri Standard Plans Drawing 609.00 for details of Type A Barrier Curb.

(K1.18)
With the approval of the Engineer, the contractor may crown the bottom of the approach slab to match the crown of the roadway surface.

(K1.19)
At the contractor's option, Grade 40 reinforcement may be substituted for the Grade 60 #5 dowel bars connecting the bridge approach slab to the bridge abutment. No additional payment will be made for this substitution.

(K1.20)
When Grade 40 reinforcement is substituted for the Grade 60 #5 dowel bars connecting the bridge approach slab to the bridge abutment, the reinforcement may be bent up to 90 degrees with a 2" minimum radius near the abutment to allow compaction of the backfill material near the abutment. Damage to epoxy coating shall be repaired according to Section 710.3.3 of the Missouri Standard Specifications.

(K1.21)
Drain pipe may be either 6" diameter corrugated metallic-coated pipe underdrain, 4" diameter corrugated polyvinyl chloride (PVC) drain pipe, or 4" diameter corrugated polyethylene (PE) drain pipe.